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BROADWATER HYDROELECTRIC PROJECT

MONTANA DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

March 1990

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Acknowledgements

This report was prepared by Paul Cartwright, Senior Energy Analyst, Energy Division.

Drafts of this report were reviewed by a number of present and past employees of DNRC. The final report was edited by Dan Vichorek.

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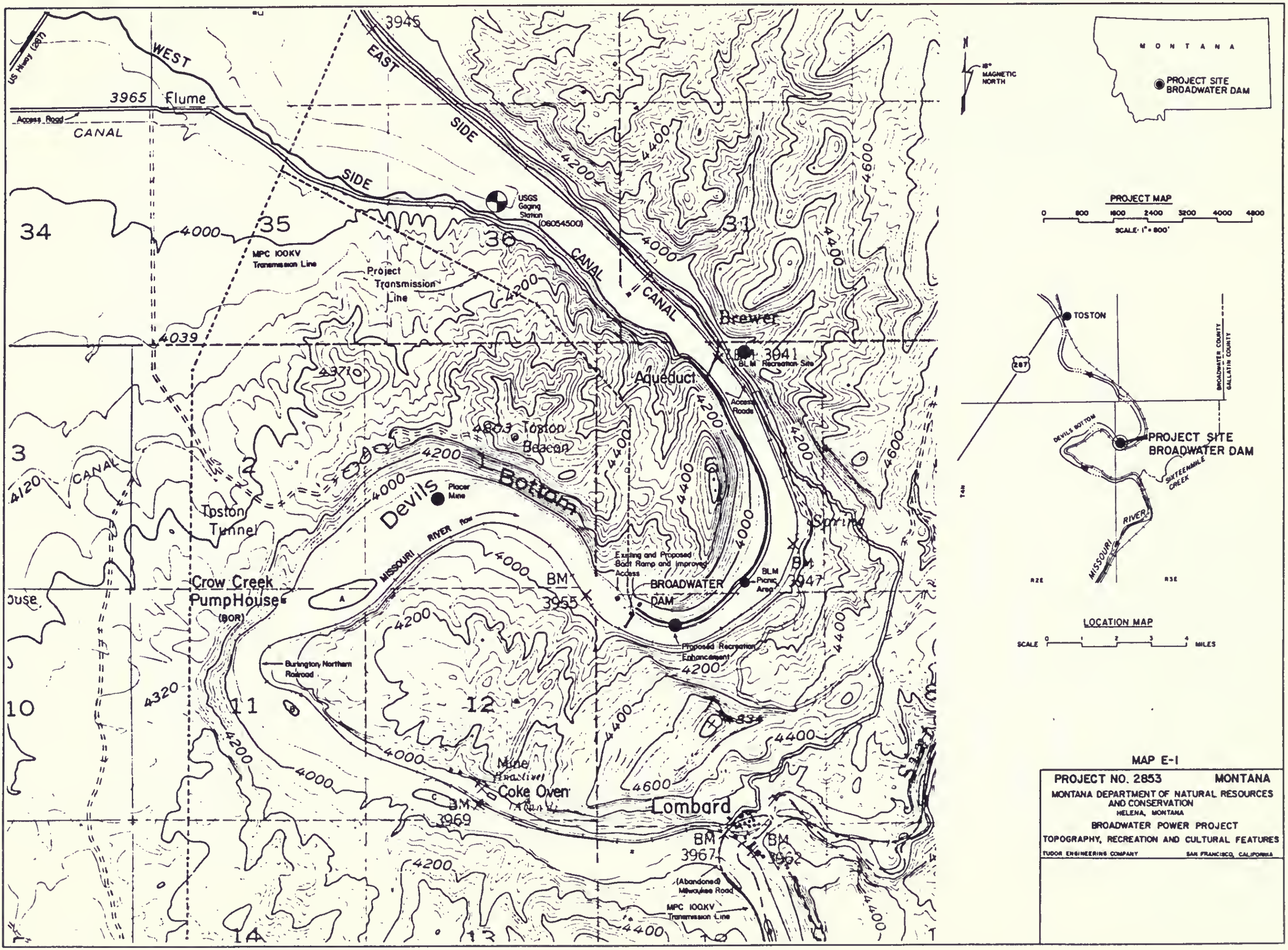

MAP E-1

PROJECT NO. 2853 MONTANA

MONTANA DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION
HELENA, MONTANA

BROADWATER POWER PROJECT

TOPOGRAPHY, RECREATION AND CULTURAL FEATURES

TUDOR ENGINEERING COMPANY SAN FRANCISCO, CALIFORNIA

Introduction

The Broadwater Hydroelectric Project is a 10 MW run-of-river hydroelectric facility installed on an existing irrigation dam. The project was built by the Montana Department of Natural Resources and Conservation (DNRC) and dedicated in September 1989. Broadwater was the first significant Qualifying Facility (QF)[1] to come on-line in Montana. As such, the history of its planning and construction may prove instructive to Bonneville Power Administration (BPA) and others that are exploring the concept of non-utility power production.

That history is a convoluted one, stretching almost 13 years from conceptualization to completion. While Broadwater, being built by a state agency, may be unique, any independent power facility can be expected to go through at least some of the same experiences. Utility plans that rely on these facilities must be flexible enough to incorporate a fair amount of uncertainty.

The Broadwater case history was done in some detail. The intent was to capture the complexity of the overall project, rather than focus on two or three "roadblocks" and how they were overcome. Discussions of roadblocks that hinder projects often carry the implication that, except for the roadblocks, the project would have been completed sooner. The history of Broadwater suggests that substitute roadblocks often wait in the wings; if one is removed, another takes its place.

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[1] Congress passed the Public Utility Regulatory Policies Act (PURPA) (PL 95-617) in 1978. Section 210 of PURPA directed the Federal Energy Regulatory Commission (FERC) to set rules to encourage non-utility organizations to build cogeneration and small power production facilities. Those facilities collectively are referred to as Qualifying Facilities, or QFs.

A further reason for producing a detailed study of Broadwater is that memory fades. Broadwater participants seemed to remember project history better than one might expect, given the length of the project. Still, all those interviewed for this study incorrectly recalled some date or sequence of events. Final outcomes sometimes explain past history rather than vice versa. Planners should be wary of "everybody-knows-what-happened" explanations of past events. Maybe they do and maybe they don't.

A brief chronology of the project follows:

Fall 1976	Tudor Engineering Company presents DNRC with the concept of installing hydroelectric facilities at existing state dams.
6-13-78	DNRC files an application with FERC for a preliminary permit.
6-4-80	FERC issues DNRC preliminary permit #2853 for Broadwater.
6-1-82	DNRC files a license application with FERC.
4-23-84	FERC grants a license to build and operate Broadwater.
10-85	Project put on hold due to economics.
2-87	Project again deemed to be viable.
6-4-87	Montana Board of Natural Resources and Conservation gives final authorization to start project.
11-2-87	Contractors mobilize equipment on site.
9-11-89	Dedication of the Broadwater Hydroelectric Project.

The cast of characters and agencies involved in Broadwater was extensive. Most of DNRC's work on the project was done by the Engineering Bureau in the Water Resources Division. Personnel from the Water Rights Bureau, Water Management Bureau, and the Water Development Bureau in the Water Resources Division also played a role, as did the Energy Division. Norm Barnard, the project engineer, probably was most instrumental in promoting the project, even when the Department was least inclined to continue. Other DNRC players included Rick Bondy, Bureau Chief, Engineering Bureau; Gary Fritz, Administrator, Water Resources Division; Wayne Wetzel, project manager; Greg Wermers, assistant hydropower engineer; Sarah Bond, project lawyer; and Larry Nordell, senior economist, Energy Division. Department directors who worked on Broadwater were John Orth (1977-1978), Ted Doney (1978-1980), Leo Berry (1981-1984), Larry Fasbender (1985-1988), and Karen Barclay (1989-present).

This long list notwithstanding, references in the text generally are presented only by organization, except where knowledge of the specific individual or office is pertinent to understanding what happened. For planning purposes, the interaction between organizations is more important than the often fascinating personality interplay within an organization.

The first two-thirds of the paper is chronological, from 1976 to 1989, focusing primarily on the evolution of the decision to build. The rationale for this emphasis is the fact that construction projects are well documented; documentation of the planning for any project usually is much less complete. This should not be unexpected: Construction attracts more lawsuits than does planning. The final third of the paper covers the individual issues of DNRC's contract to sell the power, the interconnection with the grid, water rights, and various environmental impacts. A final section discusses some conclusions one can draw from this case study.

Description of the Broadwater Project and Dam

The Broadwater (or Toston) Dam[2] is located on the Missouri River 4 miles south of Toston, Broadwater County, Montana, about 21 miles upstream from Canyon Ferry Reservoir (see Map, p. v). The Missouri River at this point has an average flow of 5,200 cubic feet per second (cfs). In addition, flows of up to 420 cfs are diverted into a canal system at the dam to irrigate 20,000 acres of land. The original dam was completed in November 1940, using federal and state funds. The dam is a concrete gravity overflow diversion dam. The flow passes over seven ogee weir sections; the total spillway length is 378 feet. Average usable head is 22 feet; total height of dam from foundation to spillway crest is 40 feet. The reservoir in back of the dam is 5 miles long, with a surface area of 327 acres.

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[2] The official name of the dam, according to the U.S. Geological Survey, is the Toston Dam. However, most people involved with the project referred to it as the Broadwater Dam, a designation that will be used in this paper. The irrigation project at the dam is the Broadwater-Missouri Water Project.

The final design of the hydroelectric project located the 10 MW power plant on the western end of the dam. The operating level of the reservoir was raised from a maximum of 3,951 feet during the irrigating season to 3,952.6 feet year-round. The turbine is a single horizontal pit Kaplan turbine capable of producing 14,000 HP at 22 feet net head. The horizontal synchronous generator produces 11,110 kVA output at 4.16 kV. Three miles of new 100 kV line connect the project to the Montana Power Company (MPC) grid.

The budget for the hydroelectric project was $25.35 million.[3] The project was financed primarily with tax-exempt revenue bonds backed by the state's coal severance tax receipts. Output of the project is sold to MPC under standard rates for QFs as set by the Montana Public Service Commission (PSC). The consulting engineer was Tudor Engineering Company, San Francisco.

This project required a number of permits. Besides the Preliminary Permit and the License obtained from FERC, DNRC obtained a discharge permit and a short-term exemption from surface water quality turbidity standards from the Montana Department of Health and Environmental Sciences, a 404 permit (water quality) from the U.S. Army Corps of Engineers, a 124 permit (streambed preservation) from the Montana Department of Fish, Wildlife and Parks, and a building permit from the Montana Department of Commerce.

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[3] The construction budget included $2.2 million held aside in a debt service reserve account.

Dam Safety and the Inception of Broadwater

DNRC entered hydroelectric development because its irrigation dams were in danger of failing. During reorganization of the state's executive agencies in 1972, DNRC inherited the irrigation projects of the old State Water Conservation Board. Some of the dams on those projects were under-designed, poorly built, or inadequately maintained; they were a threat to people and property downstream. The Legislature had not appropriated enough funds to rehabilitate these water projects. The Department eventually decided to install hydroelectric projects at some dams to generate funds that could be used to fix the other dams and reduce liability.

Planning to retrofit state dams began when John Orth was appointed director of DNRC in 1977, at the start of Governor Judge's second term. When Orth arrived, the staff presented him with the idea of retrofitting hydroelectric facilities on state-owned dams. Tudor had suggested the concept to DNRC the previous fall. A Tudor engineer, friend of another San Francisco consultant working for DNRC on the Tongue River Dam, had invited himself to a meeting with DNRC, hoping to promote dam retrofitting. Shortly thereafter, Tudor offered to obtain a DOE grant for DNRC to hire a consultant to carry out the planning work.

Orth gave the go-ahead for DNRC to work with Tudor. As a first step, Tudor and DNRC staff reviewed a recently completed status report, State Water Conservation Projects (issued March 1977), on the physical characteristics, present condition, and bond repayment situation of 35 major state-owned water projects, and a number of smaller or inactive projects.

Using information from this and other reports, Tudor identified Broadwater Dam (Broadwater County), Deadman's Basin (Wheatland County), and Painted Rocks Reservoir (Ravalli County) as warranting further review.[4] On June 7, 1977, DNRC hired Tudor to prepare a preliminary permit application to develop Broadwater dam. This application to FERC was part of a larger "reconnaissance level feasibility study" of the installation of hydroelectric power at the three dams. The final report was due August 31, 1977.

This final report, Potential Hydroelectric Power for State Owned Dams, did not come out until January 1978, because its scope had changed several times during preparation. Tudor found all three sites to be suitable for cost-effective generating projects. Broadwater Dam had the best benefit/cost ratio (1.84), followed by Painted Rocks (1.40) and Deadman's Basin (.95).[5] The benefit/cost ratios were calculated assuming the dams would replace coal-fired publicly-owned plants producing power at 26 mills/kWh (1976 $). Recommendations in the report included (1) Bonneville Power Administration (BPA) should be contacted for assistance in preparing the license application and to arrange wheeling of the power produced, 2) the output should be sold to rural electric cooperatives so the interest on the bonds would be tax exempt,[6] and 3) the state should develop the projects through "a partnership arrangement where the state's partner or partners will operate, maintain, and market the power to others within the state."[7]

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[4] David Willer, Tudor Engineering, to Orrin Ferris, Administrator, Water Resources Division, May 4, 1977.

[5] The Federal Energy Regulatory Commission had unofficially indicated that benefit-cost ratios of 0.7 or above justified construction of hydroelectric projects in the current market. Report on Potential Hydroelectric Power for State Owned Dams (1-78) p VII-4.

Vigilante and Preliminary Permit Applications

DNRC was not alone in evaluating the potential of Broadwater Dam. Vigilante Electric Cooperative, serving a large part of southwestern Montana, also was interested. In 1976, BPA had issued its customers, including Vigilante, a notice of insufficiency, saying it could not guarantee power supply for small users after July 1983. BPA being its sole supplier, Vigilante began casting about for alternate sources of power.

In March 1977, Vigilante's General Manager, Wilbur Anderson, asked BPA to look at U.S. Geological Survey data from Broadwater to determine if there was any possibility for installing generation. The next month, BPA suggested that two units of 5.5 MW each might be feasible. Anderson then contacted Montana's Senator Metcalf for information about how to file an application with FERC. Anderson later (June 6, 1977) contacted FERC directly for information on how to file. Vigilante filed on Broadwater on September 22, 1977.

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[6] Report on Potential Hydroelectric Power for State Owned Dams (1-78) p.VII-3.

[7] Report on Potential Hydroelectric Power for State Owned Dams (1-78), p.VII-1.

On May 5, 1978, DNRC petitioned to intervene on Vigilante's application. DNRC claimed the right to intervene as owner of the dam and as an entity preparing a preliminary permit itself. DNRC filed its own preliminary permit application June 13, 1978.

The competition did not sit well with either party. Anderson later accused the state of double-dealing, and of only going after Broadwater when Vigilante expressed interest in it.[8] DNRC staff were equally upset, calling Vigilante's application, which failed even to mention that DNRC owned the dam, "an affront to this Department."[9]

The state had moved deliberately but cautiously on the question of installing hydroelectric facilities at Broadwater. Tudor started work on the preliminary permit application in June 1977, and DNRC had carried on with it internally through the fall. However, when Anderson met with Orth and the Governor in June 1977, the state officials had not discouraged Vigilante's efforts. During the winter, DNRC staff provided Vigilante with information useful for preparation of its license application, while at the same time researching the Department's legal basis for obtaining its own permit. It was not until early 1978 that DNRC was able to take a formal stand in favor of installing hydroelectric facilities at state dams.

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[8] Wilbur Anderson to Kenneth Plumb, Secretary, FERC 1-15-79.

[9] Ted Doney, Deputy Director/Chief Legal Counsel to John Orth, Director, 10-11-77.

In March 1978, the Board of Natural Resources and Conservation[10] approved a Conceptual Plan for Montana Water Resources Projects. The Conceptual Plan, prepared by DNRC, reaffirmed and expanded the commitment of the state to the water resources development business. "The crucial element in the proposed plan is the hydroelectrification of state-owned dams and subsequent sale through long-term contracts of the electricity generated."[11] Broadwater was one of the three dams initially slated for development; additional dams were scheduled to be developed in later years. The revenue from the dams would be used to repair and maintain existing projects and to construct new water resources projects. The facilities were to "maximize income to the state rather than produce electricity at minimum cost"[12] or, more succinctly DNRC would charge "the highest rate the traffic will bear...."[13] The driving concern behind the Plan was the state's liability should any of its irrigation dams fail.

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[10] The Board of Natural Resources and Conservation (Board) is appointed by the Governor. The Legislature has granted it decision-making authority on certain natural resource issues.

[11] Conceptual Plan for Montana Water Resources Projects (March 1978), p3.

[12] Conceptual Plan (3-78), p.5.

On March 20, 1978, with the Conceptual Plan approved by the Board, Governor Judge authorized DNRC to file preliminary permit applications with FERC for development of hydropower at Broadwater, Painted Rocks, and Deadman's Basin.

The near failure of Tongue River Dam in May 1978 strengthened the state's resolve to pursue the hydroelectric projects. Once the applications were filed, DNRC started squabbling with the rural co-ops, especially Vigilante, over the appropriateness of the state's involvement. DNRC met with Vigilante to sort out the problems and to explore the possibility of reaching a mutual agreement on the project. None was reached. Vigilante, as it pointed out in a petition to FERC (7-19-78), was sure that "the State of Montana is not in the generation or utility business, and therefore, has no public responsibility in this respect." More succinctly, the co-ops later called the Conceptual Plan "a proposed new boondogle (sic) to try and bail the state out of a previous boondogle (sic)."[14]

To eliminate DNRC from the project, the co-ops, led by Wilbur Anderson, went to the Legislature in the next session (January 1979) with a bill (HB555) to prohibit DNRC from building or operating generation projects on state-owned dams. It also would have given nonprofit organizations (e.g., co-ops) first option to build on such projects, and would have set the minimum lease payment to the state at 1 mill per kWh, with half of the lease revenues going to maintenance and repair of the dam and associated irrigation project. The bill passed both houses (House, 60 to 38; Senate, 38 to 11) but was vetoed by Governor Judge. An effort to override the veto passed in the Senate but was defeated by three votes in the House.

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[13] John Orth, quoted in Rural Montana (July 1980), p. 6.

[14] "Report from Central Montana Electric G & T" Rural Montana (July 1980), pp.6-7.

Designing Broadwater

Even before it had formally decided to apply for a preliminary permit, DNRC was pursuing federal funds to design a hydroelectric facility at Broadwater. Following up on an effort by Vigilante, DNRC encouraged the Bureau of Reclamation to undertake a development-level study on Broadwater, and to consider studying Painted Rock and Deadman's Basin as well. DNRC also investigated the possibility of participating in a U.S. Army Corps of Engineers study of small dam hydropower. DNRC's efforts were unsuccessful. The real entrepreneurial work of hunting down funding for Broadwater engineering studies was done by Tudor.

Parallel to its work in 1977 on Potential Hydroelectric Power for State Owned Dams study, Tudor sought funding to expand and extend its work on DNRC-owned dams. On July 11, 1977, a little over a month after Tudor received its first contract from DNRC to work on the preliminary permit, Tudor was asking DOE for guidance in preparing a grant application. Tudor's application was "an unsolicited proposal (to conduct) a feasibility and hydraulic model study for a unique small hydroelectric power plant installation" on the downstream apron of the spillway.[15] A major attraction of this configuration was a reduction in the cost of civil works. DOE was not interested in the unsolicited proposal.

Tudor revised the proposal and had DNRC submit it in March 1978 to DOE under a program that provided grants to finance feasibility studies on hydroelectric generating facilities at small dams (PRDA ET-78-D-07-1706). Tudor, through DNRC, proposed to compare its innovative design with a conventional configuration, such as described in the Potential report. DNRC formally received a $95,000 grant to study the feasibility of projects at the three dams, including Broadwater, in September 1978. All the grant money went to Tudor for the engineering study. The probability of receiving this grant--DNRC knew by April that it had been selected for possible funding--gave DNRC extra cause to seek a preliminary permit from FERC.

DNRC and Tudor signed the contract to conduct the feasibility study in October 1978. The work was completed in April 1979, two months behind schedule. The delay was caused by bad weather, difficult terrain, and the problems of reconciling the results of DNRC's field survey work with Tudor's assumptions.[16] Also, DNRC staff, outside of the Water Resources Division, questioned Tudor's first draft of the report on points of energy policy and on the quality of the draft; time-consuming revisions of the report were necessary.

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[15] Robert Janopaul, Tudor Engineering to Randall Stephens, Chief, Policy Research Branch, Division of Geothermal Energy, Department of Energy, 12-29-77.

The study found that installing a hydroelectric facility at Broadwater would be economically feasible. Tudor recommended four vertical-shaft turbines with a total capacity of 9.76 MW, mounted in an open-flume configuration on the downstream face and apron of the existing spillway structure. Tudor had compared this to a conventional configuration with four 2.5 MW tube turbines installed on the left abutment of the dam. The study included various possible source of funding for the project, including loans from DOE or Bureau of Reclamation, taxable bonds, and tax-exempt bonds. Tudor recommended the latter.

Early Marketing of Broadwater

DNRC knew it wanted to sell power, but wasn't sure who to sell it to or for how much. After filing for a preliminary permit, DNRC sent letters asking potential purchasers if they would like to buy the output from Broadwater and whether they would be interested in operating and maintaining the facility. These offers went to MPC, the Central Montana Generation and

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[16] DNRC had recognized an error in a U.S. Coast and Geodetic Service datum and Tudor had not.

Transmission (G&T) Cooperative, the Upper Missouri G&T, and to six co-ops near potential state generating facilities.

Meanwhile, DNRC debated internally the price to charge for hydroelectric power, should buyers prove interested. One approach was to evaluate the proposed projects from a utility system perspective, attempting to base the value of the projects on the costs a utility would avoid by purchasing the projects output. For example, Tudor had calculated the value of potential projects at Broadwater, Painted Rocks, and Deadman's Basin assuming their output would displace power from generic coal plants. As another example, Orth had called for prices set at whatever the market would bear.

An alternative approach discussed in the Department started from the perspective of repairing irrigation facilities. Orrin Ferris, then Administrator of the Water Resources Division, argued that the annual goal for net profits from the hydroelectric projects should reflect the cost of a site-specific list of needed irrigation project repairs. Others in the Department simply discussed a target figure; $1,000,000 per year combined net profit from Broadwater and the other two projects was widely mentioned. On the whole, DNRC in these early discussions appears to have leaned more to irrigation repair perspective.

Talk of marketing eventually was suspended as the Department waited for FERC and the Legislature to determine if DNRC would and could receive the preliminary permit.

Issuing the Preliminary Permit

FERC took a long time issuing a preliminary permit for Broadwater. Competing applications slowed down the processing. DNRC had petitioned to intervene on Vigilante's permit and vice versa. MPC also intervened on both applications to protect the operation of its dams upstream and downstream from Broadwater. MPC suggested in its intervention on DNRC's application that Vigilante's plan was "better adapted to conserve and utilize the water resources than are the plans proposed by (DNRC)."[17] Both DNRC and Vigilante were late in filing their interventions on each other's applications, but both interventions were granted. Vigilante, in particular, was incensed over FERC's acceptance of DNRC's late intervention.

Vigilante and DNRC both pursued their preliminary permit applications. Their major task was addressing the comments offered by the U.S. Army Corps of Engineers, the Department of the Interior, the U.S. Fish and Wildlife Service, the Bureau of Reclamation, the U.S. Forest Service, the Montana Department of Fish and Game (after 1980, Montana Department of Fish, Wildlife and Parks), and the Montana Department of Health and Environmental Sciences. Two of the concerns raised by the agencies eventually proved especially problematic. The Bureau of

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[17] FERC Notice Granting Interventions (January 22, 1980), Project No. 2853.

Reclamation was concerned that the proposed raising of the reservoir level could damage or affect the operation of the Bureau's Crow Creek Pumping Station about a mile upstream from the Broadwater Dam. Montana Fish and Game wanted DNRC to consider installing a fish passage structure to allow spawning runs from Canyon Ferry to use the river above Broadwater.

FERC issued its order on the preliminary permits on June 4, 1980, almost three years after Vigilante first filed. FERC awarded the permit to DNRC. This decision did not surprise any of the parties. DNRC was a "municipality" within the meaning of the Federal Power Act. Therefore, under section 7(a) of the Act, it was entitled to preference for a preliminary permit if its plans were at least equal to those of a non-municipality such as Vigilante. DNRC had 24 months, until June 1, 1982, to submit a license application.

Marketing Broadwater, Phase II

Two days after FERC granted a preliminary permit to DNRC, members of the Board of Natural Resources and Conservation endorsed the Department's plan to maximize profit from the dam. The Board members unofficially told DNRC not to go below what the Department had described as a compromise price, one halfway between the cost of power production and "full-market value" for the power.

During the summer of 1980, DNRC personnel met with Western Area Power Administration (WAPA), MPC, and Vigilante to discuss selling power from DNRC projects. WAPA could not pay enough to justify the cost to DNRC of building hydroelectric projects. MPC suggested a weighted price based on its past power purchases, a price considerably below what DNRC hoped to get; however, with PURPA finally being implemented, both parties eventually decided to wait for the PSC to set rates to be paid for QFs.

Negotiations with Vigilante were rocky. Vigilante had offered to pay cost plus up to 10 percent[18], an offer that fell far short of what the Board had directed DNRC to get. Furthermore, Vigilante claimed that federal law forbid selling the power to MPC or private utilities. Vigilante held that Broadwater power had to be sold to preference customers, e.g., Vigilante, because the dam was built with federal dollars.[19] Wilbur Anderson, Vigilante's General Manager, threatened court action if the power was sold to non-preference customers. Though Vigilante was DNRC's "preferred customer,"[20] DNRC eventually gave up on Vigilante because of its failure to negotiate.

Besides negotiating with prospective power purchasers, DNRC was following developments at the PSC. The PSC was drawing up regulations to implement the federal PURPA (see Footnote 1, p.1). Among other things, the federal legislation required utilities to purchase the output from certain small power producers, collectively referred to as Qualifying Facilities (QFs). The PSC was to set avoided cost rates, the rates at which the utilities were to pay the QFs for their output. Staff in the Water Resources Division spent a great deal of time becoming unofficial experts on QF rates and contracts, while Energy Division staff testified before the PSC with suggestions on how to structure the rates. DNRC spent more time on these activities than it would have had it not been itself a prospective developer.

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[18] Great Falls Tribune (6-8-80), Sec. D, p.1.

[19] The issue of who paid for the dam had come up as early as April 1978. See Broadwater-Missouri Water Users' Association, p.46.

[20] Ted Doney to Wilbur Anderson, General Manager, Vigilante, 8-12-80.

First Plans to Finance Broadwater

Besides parties to purchase power from the projects, DNRC needed to find funds for the construction of Broadwater, as well as the other potential hydroelectric facilities.

Financing was intertwined with the question of whether DNRC could build hydroelectric facilities at all. Hydropower was mentioned as one of the works in which DNRC could engage [MCA 85-1-103(6)(1979)] but clearly had not been thought of by the Legislature as a top priority. The authority of the State Water Conservation Board to issue revenue bonds to finance its projects never had been revoked and presumably had passed on to the Board of Natural Resources and Conservation when the previous agency was absorbed. Though the Department recognized that it lacked definitive authority to build and finance hydroelectric facilities[21], it felt sufficiently confident to proceed with its planning, based on the Water Resources Act (MCA Title 85, Chapter 1, Parts 1, 2, and 3).

Once the preliminary permit was received, DNRC assembled a financing team. It did this by simply drafting the companies and personnel that already were working on a plan to rehabilitate the Tongue River Dam. The lead financial advisor was The First Boston Corporation (New York); Dain Bosworth Incorporated (Minneapolis), D.A. Davidson & Co. (Great Falls), and Boettcher & Company (Denver) also participated. Underwriters' Counsel was Dorsey, Windhorst, Hannaford, Whitney & Halladay (Minneapolis). Bond Counsel was Jackson, Oitzinger & Murdo (Helena). The organizational meeting of the financial team was September 18, 1980.[22] First Boston hoped to have the bonds sold by 1982.

First Boston immediately assembled a generic contract for DNRC to use in its negotiations. It called for power from DNRC's dams to be sold at the purchaser's avoided cost of power. This was defined as the QF rate to be set by the PSC under PURPA. For purchasers not covered by PURPA, the rate would equal the purchaser's highest cost of power per kWh, as regularly updated, for firm capacity of 10 MW or greater. DNRC would acquire financing and contract for construction of the hydroelectric facility.

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[21] "The protracted time schedule for this phase results from the uncertainity (sic) of the Board's bonding authority...." Conceptual Plan (March, 1978), p.11.

[22] DNRC had made preliminary contacts with Dorsey, Windhorst, et al. (later Dorsey and Whitney) in 1978 as DNRC was tooling up for the feasibility study of the three dams.

1981 Legislature

By 1981, DNRC was progressing nicely on the Broadwater project, but some Montanans thought the state should not be involved in the development of hydroelectric facilities at all. If the state were to be involved, these thinkers felt it should not try to get market value for the power. Sen. Frank Hazelbaker, from Dillon (headquarters of Vigilante), said the state's attempt to build generators and sell power was a "socialistic idea."[23] He might have been one of the more extreme opponents, but he was not alone. Vigilante personnel bragged that they had enough votes in the Legislature to prohibit the state from getting into the power business.[24]

The law that was enacted did not put the state out of the hydroelectric business; in fact, DNRC participated in revising drafts of the law, hoping to retain some control over its dams. The law established a framework for the development of hydroelectric projects at state-owned dams. This framework came with a list of conditions. Senate Bill 229 (later MCA Title 85 Chapter 1 Part 5) authorized DNRC to construct and operate small-scale hydroelectric facilities. First, however, DNRC had to find that a site was feasible for a facility, and then offer the site for lease. Only utilities, co-ops, or Montana corporations planning to use a substantial portion of the output internally were allowed to apply. Potential applicants had 180 days to submit an application. Only if the Board found that the bids received were not advantageous to the state, or if no bids were received, could the Department pursue construction of hydroelectric facilities.

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[23] Great Falls Tribune (6-8-80), Section D, p.1.

[24] David Willer, Tudor Engineering, to Rick Bondy, 10-7-80.

Preparation of Application for FERC License

Funding was a continuing problem for DNRC's effort to build a hydroelectric facility at Broadwater. DNRC queried DOE regarding the possibility of obtaining a loan to fund the FERC license application. In response to DNRC's inquiries, DOE sent (9-17-79) information about an upcoming Loan Program for Small Hydroelectric Feasibility Studies. The program had the attraction of forgiving the loans if the projects proved economically or technically unfeasible or if licensing was denied.

DNRC made no move to apply for a loan until after FERC issued the preliminary permit in June 1980. In August, Tudor submitted to DNRC a proposal to provide engineering services for preparation of the Broadwater license. Conveniently, Tudor's proposal was "prepared in such a form as to allow for subsequent submission to the Department of Energy."[25] DNRC submitted a loan application to DOE in October, requesting $55,000 of the $61,700 projected cost of preparing the license application. A loan of $50,000 was granted in February 1981. First payment was due four years after signing (4-15-81) and the last payment was due by ten years after signing.

DNRC began work on the license application immediately after the preliminary permit was received. Tudor had responsibility for assembling the engineering, cost, and performance data and drawings. DNRC's Facility Siting Division (FSD) was given responsibility for preparing Exhibit E, the environmental assessment. Following some initial work during the summer, FSD began serious work on Exhibit E during the fall, holding the scoping meeting on October 6, 1980. The schedule was very tight: field work was scheduled for completion by November 14, with departmental review to be complete by December 31. The Engineering Bureau had taken a stance much like that of a private developer: they wanted the environmental issues dealt with quickly, so as not to hinder the project's progress.

The Exhibit E covered water use and quality, fish, wildlife and botanical resources, historical and archaeological resources, recreational resources, and land management and aesthetics. For the most part, only minor impacts were identified. The biggest mitigation issues identified were the protection and enhancement of fisheries, coordination of recreation development with the federal Bureau of Land Management (BLM), and preservation of a prehistoric campsite and a post-1900 coke oven. DNRC pledged to fund or conduct studies and mitigation activities as needed if the license was granted.

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[25] Robert N. Janopaul, Tudor Engineering, to Rick Bondy, 8-13-80.

The fisheries issue was to be a major one throughout the Broadwater Project. Upon first learning about Broadwater, the Montana Department of Fish, Wildlife and Parks (DFWP) requested a study to determine appropriate instream flows. Given that Broadwater was a run-of-river dam, DFWP then revised its position, arguing that a fisheries study was needed because little quantitative data were available, "even though (the stream section) had been designated by the Montana Fish and Game Commission as one of Montana's 'Blue Ribbon' waterways."[26] In particular, DFWP wanted the possibility of installing a fish ladder considered. DNRC felt that a fish ladder could cause more harm than good, by allowing trash or unwanted exotic fish from Canyon Ferry into the upper Missouri drainage, and more importantly, would be a source of extra cost, reduced revenue, and delay.[27] However, Tudor eventually argued, after some thoughts to the contrary, that the licensing could be delayed unless DNRC agreed to follow the recommendations of the fishery agencies and conduct a study.[28]

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[26] "A Study Proposal to Determine the Need for a Fishway at Toston Dam on the Missouri River." Montana Department of Fish, Wildlife and Parks. License Application for Broadwater Power Project (Project No. 2853). (12-10-80), Exhibit E, Appendix E-1, p.1.

[27] "The total annual cost of fish ladder issues [if one were installed] is $170,000," due primarily to the amount of water diverted away from the turbine and down the ladder to provide "attraction" flows. However, "a decision on this will have to (continued...)

Work on the license application proceeded at a fast pace. At the time DNRC filed its second Six Month Statement to FERC (6-1-81), DNRC thought the license would be ready for submittal in August. However, the discovery that the Bureau of Reclamation in the future might have legal rights on up to 300,000 acre-feet of water upstream (see Water Rights, p.67), and the resulting concern over the economic viability of the project, put preparation of the license on hold. The potential cost of environmental mitigation measures raised similar concern, though to a lesser degree. In August, DNRC directed Tudor to conduct a study to determine the impact of the Bureau's rights in the admittedly unlikely event that the Bureau could find a user for the water. Tudor looked at the economic viability of the project as proposed and at a down-sized (i.e., three turbine) version. Broadwater still looked viable, and work resumed on the license application in December.

FERC received the license application on June 1, 1982, right on the deadline. Review time for divisions and agencies

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[27] (...continued)
weigh the benefits of reduced cost to the power project against the benefits of being a good-guy developer. There are reports of public and possibly legislative support for the fish ladder." Norm Barnard to Richard Bondy, 6-15-81.

[28] Gordon Little, Project Manager, Tudor Engineering to Norm Barnard, 11-23-81.

outside the Water Resources Division had been limited, causing some unhappiness. Staff complaints in the Energy Division (successor to FSD) about the tight schedule sounded similar to those they sometimes raised when they dealt with private developers.

Once the application was in, DNRC could do little more than sit and wait. FERC did request some minor modifications to the application. Copies of DNRC's application were sent to relevant agencies for their comments on November 15, 1982. DNRC checked regularly with FERC, to encourage expeditious treatment of their application. However, with the "hydro gold rush" still on, FERC was inundated with applications and was moving slowly.

Leasing Broadwater

Before DNRC could proceed with the lease or development of Broadwater, it needed the Board to approve the feasibility study of the project and to authorize public notice of the site's availability for lease. This was necessary to comply with the legislation passed in 1981 (see p.21). Immediately after filing its license application with FERC, the Department went to the Board to seek approval and authorization (6-18-82). Somewhat optimistically in retrospect, DNRC envisioned no problem in getting responses to the lease offering within 90 days.[29] DNRC anticipated having the leases in hand and evaluated by the end of the year.

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[29] "Although the law establishes a maximum time for response of 180 days, the shorter time period (i.e., 90 days) is (continued...)

This did not happen. Preparation of a Request For Proposals (RFP) took nearly two years. Interpreting the relevant legislation and figuring out the issues pertaining to leasing took time. The more noteworthy problems, however, were allocating DNRC's legal staff and resolving the constitutionality of using coal severance tax bonds to back the hydro projects.

DNRC started preparatory work on an RFP for Broadwater even before receiving formal Board authorization; however, it soon had to switch over to preparing an RFP for the Painted Rocks Project. DNRC had obtained a FERC exemption from licensing requirements for this proposed 5 MW facility. Though Painted Rocks was a lower priority than Broadwater, FERC deadlines required DNRC to issue the lease on it first. However, the RFP for Painted Rocks was expected to be usable for Broadwater.

DNRC staff spent the summer and fall of 1982 figuring out what was involved in leasing a site. Questions to be addressed ranged from how to post notice of the RFP in the newspapers to the amount of control DNRC should have over the lessee's plans to calculation of the royalty. Legislation was prepared (and adopted in 1983) to amend the leasing process so DNRC could build and finance a facility itself if that were necessary to avoid

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[29] (...continued)
reasonable and will prevent unnecessary delay of the project." Leo Berry, Director, DNRC to the Board of Natural Resources and Conservation, 5-27-82.

forfeiting the FERC license. Most of the discussions took place within the Engineering Bureau and the Department's legal staff; Tudor, which prepared the first draft of the RFP, also was involved, as eventually were all the legal and financial consultants.

By 1983 the adequacy of the Department's legal effort was a major source of contention within the Department. The pace of the RFP development, never fast, had became even slower when the Director temporarily reassigned the lead lawyer to other legislative matters in the 1983 session.[30] In spite of the extra assignment, the lawyer was putting in almost three times as much time as had been budgeted by Water Resources. As development of the RFP dragged on, the Water Resources Division became more insistent that the legal staff speed up or that outside counsel be retained. Legal argued that Water Resources did not appreciate the legal criteria that had to be observed. These exchanges went on for over a year; by March 1984, Water Resources had started the paperwork to hire a new lawyer. Even then, applications weren't taken until September and the Department then decided to delay filling the position. The hydropower counsel was not hired until mid-1985.

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[30] "(I am) feeling despair generated by the inevitable conclusion that this project (i.e., Painted Rocks) has received a priority in this agency sufficiently low to preclude its construction." Gary Fritz to Leo Berry, 4-5-83.

Constitutional Challenge

In the course of preparing the Painted Rocks RFP, a more substantive issue finally was addressed: the legality of issuing bonds backed by coal tax revenues to finance capital projects. The 1981 Legislature had established this financing mechanism. In August 1982, DNRC, the Board of Natural Resources and Conservation, and the Board of Examiners[31] filed an original application for a declaratory judgment in the Montana Supreme Court to determine if such financing was constitutional. The application was denied on the grounds that the Court lacked jurisdiction to render a declaratory judgment where no adverse party existed to raise and litigate the constitutional questions involved. DNRC, as well as the bond company, felt it necessary to encourage litigation against DNRC to determine if bonds could be sold under this legislation. Such litigation is common prior to bond sales to determine if the bonds are marketable. In September 1983, DNRC found a taxpayer who was willing to raise the constitutional issues. On September 29, 1983, Ray Grossman, a resident of Broadwater County, filed an original application for a declaratory judgment in the Montana Supreme Court. The Court accepted jurisdiction.

The ostensible grounds for the suit were the Department's issuing an RFP for leases. The 1983 Legislature authorized the

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[31] The Board of Examiners consists of the Governor, the Secretary of State, and the Attorney General, all elected positions.

Department to issue bonds for Broadwater, Painted Rocks, and Deadman's Basin.[32] The constitutionality of such funding would be immediately relevant once DNRC issued an RFP. The internal delay in getting the RFP finalized and issued complicated attempts to initiate the case. It also increased the tension between the lawyers and the engineers within the Department.[33] Legal notices for the Painted Rocks RFP, the first RFP to be issued, finally were placed late in 1983. MPC, Ravalli County Electric Co-op, and Western Montana G&T expressed interest in developing Painted Rocks and attended the pre-proposal meetings; however, when the March 1, 1984, submittal deadline came, no proposals were submitted.[34] Nonetheless, the test case was filed before the Montana Supreme Court that same day.

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[32] Financing was authorized by HB 885. Most of the authorization was for the hydroelectric facilities; some additional money was to rehabilitate three state-owned dams, and the remainder was for loans to local government water projects. This marked the first time the Legislature had mustered the three-quarters vote needed to approve earmarking future money from the permanent coal tax fund.

[33] "(Bob Lane, lead lawyer) informed me that we had better get the lease proposal mailed out within 2-3 weeks or we may jeopardize the Water Development test case." However, Barnard argued that "... now is hardly the time to be concerned about time frames for getting this done. After all, the original request to draft this document was made over and over and over--over a year ago." Norm Barnard to Richard Bondy and Glen McDonald, 11-9-83.

The Court rendered a declaratory judgment on May 8, 1984.[35] Two of the key issues raised by the plaintiff were that the bonds constituted a continuing appropriation and that, contrary to the constitution, they would provide benefit to private individuals and companies. The Court found against the plaintiff and in favor of DNRC on all points.

RFP Broadwater

FERC issued DNRC a license for Broadwater on April 23, 1984. The license initially required construction to begin within two years. Actually, construction did not begin until late in 1987. The biggest issues faced in the intervening time were, first, who would build the project, and later, would the project be economical to build at all.

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[34] The co-ops said the time allowed for preparation was too short, and MPC decided it didn't need another resource. The co-ops were particularly upset about the leasing procedure. According to the Independent Record, "Gary Mason, manager of the Ravalli County co-op, blamed the department for undermining his efforts." "He said he suspects the department all along wanted to build the plant and sell the electricity as a source of revenue." (3-2-84)

DNRC later abandoned Painted Rocks on economic grounds and because the U.S. Forest Service placed conditions on the project that were unacceptable to DNRC. As of 1989, the Western Montana G&T was pursuing a license for Painted Rocks.

[35] Grossman vs. State of Montana, 209 M 427(1984).

In 1982, the Board of Natural Resources and Conservation approved offering the Broadwater site for lease. The intent, in keeping with directions from the Legislature, was to give non-government organizations a chance to develop the project. DNRC did not offer to lease Broadwater while it was developing the Painted Rocks RFP and arguing the constitutionality of coal tax revenue bonds.[36] Shortly after the court case concluded, DNRC received its license for Broadwater from FERC. Once it had that in hand, DNRC moved to issue an RFP, based on the Painted Rocks RFP. It previously had signed Tudor to reevaluate the economics of Broadwater and three other projects.[37]

Tudor was retained April 4, 1984, and the Feasibility Update Report was issued in August. The study simply updated old construction schedules and cost estimates and applied current power purchase rates to determine project benefits. The benefit cost ratio improved. In the 1979 study, the benefit cost ratio ranged between 1.29 and 1.80; the 1984 Feasibility Update, testing a wider range of discount rates and costs per kWh, found the ratio to be between 1.14 and 2.05. The report concluded that

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[36] DNRC previously had attempted to sell Broadwater power to BPA in 1981 in response to BPA's request for electric generating resources of 500 kW and larger (Norm Barnard to Resource Acquisition Manager, BPA, 10-16-81). BPA later turned down DNRC's proposal as insufficient.

[37] Cooney Dam had been added to Painted Rocks and Deadman's Basin as a high-probability project.

"the Broadwater Hydroelectric Project appears to be very feasible."[38]

The RFP for Broadwater was issued in July 1984. At least ten parties requested a copy of the RFP. At the end of August, when letters of intent were required, four of those parties stated that they would consider submitting a proposal: Westinghouse Electric Corporation, Western Energy Corporation (a coal mining subsidiary of MPC), Western Montana G&T, and Energy Associates (a private investment firm). Energy Associates expressed interest even though under the law passed in 1981 it was not eligible to hold a lease on a state dam (see p.22).[39]

The closing date for proposals originally was November 1, 1984. It was moved back to December 14 and then again to January 28, 1985. One proposal was received, from Western Montana G&T; the proposal did not comply with the RFP. Western Montana G&T had submitted an offer to negotiate a lease, rather than a lease proposal itself. The G&T claimed the time for response was too brief and the project too complex to warrant risking the $2 million bid bond DNRC had requested.[40] Western Energy cited similar concerns.

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[38] Feasibility Update Report (8-84), p.14.

[39] At DNRC's request, the law was modified during the 1985 Legislative session to make any party eligible to seek a lease at a state dam. Pete Gross, affiliated with Energy Associates and several other partnerships, and president of the Montana Hydropower Association, was instrumental in promoting this amendment.

The Department advised the Board that the G&T's proposal was deficient in almost all respects. DNRC also asked the Board to find that since no acceptable lease proposals were received, DNRC could consider developing the site itself. The Board did so at its March meeting. However, the start of actual construction was subject to the Board finding that "the department has clear and convincing evidence that construction is economically feasible and is the most practical means by which the facility could be developed" (MCA 85-1-509).

Even though the RFP process was over, outside parties continued to express interest in Broadwater. Western Montana G&T wanted to start negotiations for a lease, an offer that was declined. In April, Ideal Cement Company, located a few miles upriver at Trident, inquired about building Broadwater for its own use. Negotiations followed, but foundered that summer over issues of ownership and financing. Finally, Sithe-Energies, through its agent Winner/Wagner and Associates, Inc. (New York), expressed interest first in an outright purchase of DNRC's rights to develop Broadwater, and later in building and operating a turn-key facility. Negotiations were getting under way when the economic viability of Broadwater collapsed.

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[40] On November 15, the G&T had requested an extension until March 29, 1985, figuring it would take at least that long to get a legal opinion on construction financing. Jim Sewell, Western Montana G&T, to Rick Bondy, 11-15-84.

Broadwater The Not Too Viable

The cause of the collapse was the revision of the avoided cost rates MPC was obliged to pay QFs. The PSC had begun a revision of the methodology for calculating avoided cost in the fall of 1984. The PSC had recognized that its previously approved methodology yielded avoided cost rates that were higher than the costs actually faced by the utility. Water Resources Division favored signing a contract with MPC quickly, while the old higher rates were still in effect. The Energy Division took a more sanguine position on the new rates, arguing that the old rates were incorrect and fostered poor energy policy.[41] Shortly after his arrival in January 1985, DNRC's new director, Larry Fasbender, decided it would not be good public policy to sign a contract that effectively required rate payers to subsidize DNRC.

The PSC released its draft rate order September 12, 1985. The order drastically reduced the rates private utilities were obligated to pay QFs. With the PSC's decision, Broadwater no longer appeared to be economically viable. The Water Division decided on October 31 that the possible range of project costs, given a range of mitigation costs and a 9.375 percent interest rate, was equivalent to 42 to 59 mills per kWh (1986 $). This was above the range of avoided costs predicted to be set by the PSC in its forthcoming order. Even without any mitigation costs, Broadwater would have been economically marginal at 9.375 percent interest. Though the interest rate was almost at the middle of the range considered in the 1984 study, and though estimates of capital costs had dropped,[42] Broadwater was just too expensive.

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[41] A formal statement of this was sent to DNRC Director Larry Fasbender after the PSC's draft order was released. "Payments to QFs that are higher than actual avoided costs requires a subsidy by ratepayers, which is contrary to the intent of PURPA. Rather than hindering the legitimate development of the renewable energy industry, as is claimed by some QF proponents, the new rate ensures that only cost-effective projects are built.... The claim that the new rate will discourage development is self serving and should not be considered in setting rates." Larry Nordell, Senior Economist, to Larry Fasbender, Director, 9-27-85.

Stalling for Time

At that point, DNRC chose to limit itself to work that was "absolutely required to maintain the FERC license."[43] That work still covered an extensive list of topics: completing current studies on archaeology and fish ladders, proceeding with the water right application, applying for exemption from FERC's required review of dam hazards by an independent consultant, requesting the U.S. Army Cold Regions Laboratory for assistance with the problem of project-induced ice buildup on the adjacent railroad, negotiating with the U.S. Bureau of Reclamation to assign responsibility for protecting the Crow Creek Pumping Station from flooding, and requesting a schedule extension for meeting the FERC license requirements. (The work to reduce these impacts is discussed below.) As long as this list was, the amount of staff time required by the Broadwater project was low enough that staff members previously working on Broadwater were reassigned to other work.

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[42] DNRC and Tudor met September 3, 1985, to discuss a redesign of the plant suggested by Tudor. Tudor now advocated a conventional design, instead of the apron mounted turbines. Tudor felt it might cost less and definitely would be easier for a small contractor to do. Advances in turbine technology made a single bulb turbine economically preferable to the previously studied multiple tube turbines.

[43] Norm Barnard, Glen McDonald to Rick Bondy, 11-15-85.

The request to FERC for a license extension was submitted December 12, 1985. Such extensions are issued routinely, and DNRC received its extension January 27, 1986. DNRC had until April 22, 1988 to start construction, and until April 22, 1991 to complete construction. The license required DNRC to undertake certain studies and mitigation actions beyond what DNRC was willing to do. Given the dubious nature of the project's economics, DNRC stalled instead, a time-honored tactic of public and private developers alike.

Progress on the Emergency Action Plan (EAP) demonstrates this stall as well as anything. EAPs are dam owners' plans for responding to dam failures. DNRC maintained that Broadwater was a low hazard dam; FERC held otherwise. DNRC's December 12, 1985, request for an extension included an extension of time for filing an EAP. FERC agreed to a June 30, 1986, deadline. During a project inspection by FERC on July 7, 1986, DNRC announced that it intended to apply for an exemption from the EAP requirements. FERC granted, until October 1, 1986, an extension for filing an exemption request. Having received nothing by that date, FERC, on October 30, asked that DNRC file that exemption request by November 30. FERC followed with a phone call on December 18 suggesting enforcement action could be coming, and finally by another phone call the next day saying, "No, in fact hell no," they would not grant any additional time to file the EAP.[44] With the national hydro goldrush winding down, and a new computerized license monitoring system installed, FERC was better able to track deadlines and was doing so.

The economics did not improve while this stall was on. A March 1986 estimate of construction costs had climbed from the previous estimate of $21,318,000 to $26,895,000 (January 1986 $). About 40 percent of that increase was due to using more pessimistic assumptions about the cost of protecting the adjacent railroad. DNRC tried that month to convince MPC to take over the dam as an alternative to its proposed upgrades on its own dams; the idea never went beyond preliminary discussions. It was against this background that Pete Gross and Potosi Power offered to take over the Broadwater project.

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[44] Norm Barnard to Rick Bondy and Glen McDonald, 1-5-87.

Pete Gross and Potosi Power

Pete Gross had been involved since 1984 with efforts to develop hydroelectric projects on state dams.[45] He had made offers to develop Broadwater even when he was not eligible to do so under state law.[46] In September 1986, he, as Potosi Power, re-started discussions with DNRC over Broadwater. DNRC was reluctant to spend any more money on the project; however, Gross thought Potosi might be able to work with the state to develop Broadwater. After exploring the idea, Gross wrote on November 26, 1986, seeking a written preliminary commitment from DNRC to justify his expenditure of time and money to prepare a proposal. On December 8, DNRC expressed interest in working with Potosi or any other private firm. Given his previous discussions with DNRC, Gross might have interpreted the commitment as more significant than indicated by the letter alone.

The Water Resources Division clearly was not optimistic about DNRC's prospects for building the project. Water Resources did not believe DNRC could meet FERC requirements necessary to keep the license alive (i.e., prepare the Emergency Action Plan and select the contractor to complete the Independent

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[45] Groups he was affiliated with included Oxford Arbitrage Associates/Essex Group Joint Venture (OEV), Oxford Energy, Energy Development Associates, Energy Associates, Montana Ventures, Big Sky Hydro Limited Partnership, Tongue Hydro Limited Partnership, and several other limited partnerships on specific state dams.

[46] For instance, in letters to Norm Barnard, 8-30-84, and to Gary Fritz, 2-7-85.

Consultant's Review (ICR) of dam hazards by December 30, and carry out previously identified dam safety repairs by January 9). Potosi offered to continue the work necessary to keep the license--and its chance at Broadwater--alive. Water Resources accepted and left it up to Potosi. This was done in spite of the staff's grave concern about the lack of a formal agreement and reservations about the competence of Potosi to meet the very tight timelines.

Potosi did make the deadlines, at least. An EAP, though deficient, was sent in; CH2M Hill was designated to do the ICR;[47] and--instead of doing the repairs--Potosi prepared a new schedule for dam safety repairs, which DNRC then submitted to FERC.[48] If FERC finally was going to enforce its deadlines, then Potosi had bought some more time for the project. The problem DNRC faced was posed as "whether to go with Potosi or to drop the license."[49] On January 20, 1987, Potosi met with DNRC to present a formal agreement to become DNRC's agent and work to bring the license into compliance, in return for which DNRC would agree to negotiate in good faith a contract for Potosi to operate the project as a turn-key arrangement.[50]

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[47] Later, however, DNRC hired Harza Engineering to do the ICR. DNRC felt that Harza was better suited, and in any event, Gross wouldn't release CH2M Hill from its agreement with him.

[48] However, Potosi's dealings with FERC had prompted FERC's final explosion over DNRC's dragging its feet. (See p. 38.)

[49] Sarah Bond to Broadwater project team, 1-19-87.

Potosi asked for "the exclusive right to finance, construct, and operate a hydroelectric power generation project at Broadwater Dam upon such terms and conditions as the parties shall determine to be reasonable." DNRC rejected this and asked for a detailed proposal by February 9. Potosi responded as requested with a proposal that offered DNRC two percent of the gross for the first 35 years, an offer Potosi projected to be worth between $3,104,848 and $3,444,129. DNRC responded that "the proposal is not within the standard of the industry for even a project of much less complexity, and does not afford the state any certainty upon which to base an agreement."[51] Furthermore, the return offered DNRC seemed low compared to the value of the project. DNRC told Potosi that other options would be pursued.

One Last Review of Broadwater's Economic Feasibility

DNRC's enthusiasm for other options had been revived by a review of Broadwater's economics. Parallel to its dealings with Potosi, DNRC made one last check of the economics of Broadwater. Interest rates had dropped since 1985, leading DNRC to think the economics might have improved. Moreover, the Director was informed that the 1986 Tax Reform Act still permitted tax-exempt bonds to be sold for certain projects if they already had a FERC license and could be expected to be completed by the end of 1988.[52] On November 26, 1986, Water Resources Division, at the request of the Director, asked Energy Division to review the financial feasibility of Broadwater. The original request was to complete the work no later than the end of December; however, the work was expanded and the final report came out February 5, 1987.

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[50] A draft of this agreement was prepared by Leo Berry, the previous director of DNRC, at the request of Potosi. Berry ceased to represent Potosi shortly thereafter, to avoid the appearance of conflict of interest.

[51] Larry Fasbender to Pete Gross, 2-12-87.

The construction cost figures used in Energy's analysis were basically the same, adjusted for inflation, as those used in the analysis that led to the 1985 decision that Broadwater was not economically feasible. The major differences were 1) the use of a 7.5 percent interest rate rather than 9.375 percent, and 2) reducing the estimated cost of mitigating ice damage to the railroad track by dropping winter reservoir levels rather than by raising the tracks. The analysis also looked at the possibility of setting up a cash reserve to protect against the possibility of negative cash flows in the early years. This time, Broadwater looked feasible.[53]

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[52] Different people remember, variously, this being brought to the Director's attention by Tudor, First Boston, and the Water Engineering Bureau.

[53] Avoided cost rates also were slightly higher than previously anticipated. DNRC's 1985 decision was based on the estimated rates of 28-38 mills/kWh (Energy Division) or 32 mills/kWh (MPC) in 1986. The actual 1987 rates for a long-term contract with a facility like Broadwater were equivalent to 37 mills/kWh.

The Final Decision

DNRC went to the Board on March 13, 1987, to announce it planned to build Broadwater. Potosi had not given up; it had continued its dealings with FERC and with other state agencies. Potosi also presented its own offer at the Board's meeting. The Board directed DNRC to search for a private concern to finance and construct the Broadwater project. Although DNRC did not think another RFP was feasible at this late date, it issued one in early April.

The May 1 deadline for responses to the RFP came and Potosi was the only group to submit a proposal, though other firms continued to express interest after that date. On March 18, Potosi had presented a more detailed and revised offer to finance, construct, and operate Broadwater for 35 years; it submitted this same proposal in response to the RFP. With this offer, Potosi would get 40 percent of the net (before taxes) income and pay taxes, while DNRC would get 60 percent and pay royalties to the local irrigation association. Potosi figured its new offer would have a present value to DNRC of $14,166,336 to $16,524,243. This was a significant increase over Potosi's February 9, 1987, offer.

On May 20, the entire board of Potosi resigned, except for Pete Gross, reportedly for reasons related to Gross' financial management. With this shake-up in Potosi, Gross had to find alternative financial backers. He was able to arrange a deal with Independent Hydro Developers.[54] Potosi/IHD quickly prepared yet another offer to DNRC. In return for developing and operating Broadwater, Potosi/IHD would give DNRC one percent of gross revenues, 60 percent of net revenue (after equity had received a 13 percent rate of return), and an option to buy or renew the project after 35 years. IHD estimated this would have a present value to DNRC of $5.8 to $8 million dollars. Given the limited time available, and the limited information submitted by IHD, DNRC could not verify the estimates.

The Board met June 4. It had before it Potosi's March 18 proposal and DNRC's analysis of it, Potosi/IHD's four page May 29 proposal, and DNRC's Definitive Project Report.[55] DNRC argued that its proposal offered the best investment for the state. Further, DNRC emphasized that because DNRC had exercised its preference rights as a municipality to get the license in the first place, FERC regulations required DNRC to retain control of the project (e.g., DNRC could not develop the license with a partner, even though it could hire a private group to develop the project).[56] Whatever was to happen, however, DNRC insisted that a decision had to be reached immediately, in order to comply with FERC deadlines and to obtain tax-exempt financing. Potosi/IHD countered by verbally upping their offer at a break in the meeting. The Board felt pressured and short on information, but voted 4-3 to find that using coal severance tax financing, as proposed by DNRC, was more feasible than private offers.

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[54] Independent Hydro Developers (IHD) was a limited partnership formed in 1982 to develop and construct hydroelectric projects. It was based in Minneapolis. Gross served on the Board of Directors of the National Hydro Association with Ingolf Herman of IHD.

[55] This report was prepared by Tudor in April and early May, and submitted May 16. Tudor scaled back the size of the project slightly, but found that raising the adjacent railroad track would be more cost-effective than dropping the reservoir level during the winter. Tax-exempt bonds were necessary to make the project feasible. Present worth of 35 years of expenses and income, assuming 8 percent interest, was $13,776,000.

Potosi/IHD complained that the staff had a conflict of interest in evaluating private proposals as well as promoting its own. Pete Gross said the Board's decision would discourage small private hydropower developers from bidding on future projects.[57] Potosi/IHD asked the Board to reconsider its decision, and suggested more penetrating questions to draw out the weakness of DNRC's case, but the Board declined.

Potosi then faded from the scene, by and large. Later that summer, Gross did request that DNRC pay Potosi's costs for maintaining the license. At the direction of the Board, Fasbender met with Gross to determine his expenses. Gross estimated those costs, incurred between October 1, 1986 and April 30, 1987, at $40,000. Since Gross did not provide any documentation, DNRC declined to pay. In any event, DNRC maintained that Gross knew he was working at his own risk.[58]

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[56] The question of DNRC's responsibilities under FERC regulations and Montana legislation was the topic of extensive discussions. The legal points are summarized in Steve Brown's (legal counsel to the Board) memorandum to the Board on "BNRC Authority Under Section 85-1-509(2), MCA," dated June 1, 1987.

[57] Helena Independent-Record 6-5-87. This claim should be taken in the context of DNRC's pending foreclosure on another of Gross' projects to which it had loaned money.

Potosi/IHD popped up once more, in the spring of 1989, when the hydroelectric facility was nearly completed. Potosi/IHD offered to buy the project from the state for the sum of the costs DNRC had incurred, plus a percentage of the future profits. The new administration, and its newly appointed members to the Board, were sympathetic to the concept of privatization, but took no action on Potosi/IHD's proposal. The proposal was very sketchy, lacking the "fine print" that actually specifies a proposal. Further, the Board's response was influenced by FERC license requirements, contractual obligations with MPC, legal obligations with the water-users association, the minimal risk involved in DNRC completing the project, and the fact that there might not be any profit after the Potosi/IHD investors received their requested return.

Broadwater-Missouri Water Users' Association

With the Board's June 4, 1987, decision, DNRC had a clear mandate to build the project. What it lacked--at least in some people's minds--was clear title to the dam itself. The

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[58] Gross complained that while he knew he was working at his own risk, he thought he only was competing against other private firms, and not DNRC. See Pete Gross to Rick Bondy, 11-26-86, and the transcript of Gary Fritz's comments to the Board, 1-9-87.

Broadwater-Missouri Water Users' Association (BMWUA) argued that it owned the dam.

This debate had run, on and off, from the earliest days of Broadwater hydroelectric project, starting in 1978. BMWUA maintained that it was paying off the irrigation project bonds. DNRC's position was that BMWUA "(had) not paid for the project, but for the water supplied by the project, in an amount calculated to enable the state to recoup its investment."[59] In 1979, Vigilante, seeking to strengthen its position before FERC, claimed that BMWUA, and not DNRC, owned the dam.[60] In 1983, BMWUA offered to settle for 50 percent of the net project revenue. In February 1987, BMWUA weighed in on the side of Potosi, suggesting that "it is beneficial for both the State Department (sic) and the Association to let private enterprise do the developing."[61] Tactical considerations in the Association's own negotiations with DNRC might have influenced its public support of Potosi; for whatever reason, at the Board meeting in June 1987, the Association opposed Potosi.

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[59] Ted Doney, Director, DNRC, to Bob Davis, President, BMWUA, 4-24-78. The actual language in Section 7 of the water purchase contracts reads: "It is expressly understood that all the right, title and interest in and to the Project and the water rights exercised in connection therewith shall be and remain in the Board, and that the water purchaser shall acquire no right, title or interests in the project or such water rights."

[60] Wilbur Anderson, Vigilante, to FERC, 1-15-79.

[61] Robert Davis, Chairman, BMWUA, to Larry Fasbender, 2-9-87.

DNRC and BMWUA finally settled that July. BMWUA had raised the possibility of filing suit. The suit might have been without merit, but the DNRC no longer had time to pursue the matter without endangering the bond sale. DNRC agreed to deposit one-quarter of the net revenues from Broadwater into an account until the total reached $1 million. The state Board of Investments would manage the account for BMWUA. BMWUA could use the interest income, but only for rehabilitation, improvement, and repair of the irrigation project facilities. DNRC retained approval authority for purchases over $5,000.

Financing

The Legislature had been willing to finance the Broadwater project since 1983. That year, the Legislature authorized up to $28.6 million in coal severance tax bonds for the project. The following session, in 1985, $23,044,000 was re-authorized.[62] In 1987, the Legislature once more re-authorized the sale of bonds, this time at $26 million, to build the hydroelectric project at Broadwater. The project was initiated while this last authorization was in effect. The committee hearing on these bonds took approximately 10 minutes; the Legislature, after hearing about hydroelectric projects for eight years, apparently had no further questions.

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[62] The estimated cost of the dam as provided by DNRC varied year to year as financial assumptions and cost estimates changed.

The financial team retained by DNRC was slightly different from the one first assembled in 1980 (see p.20). First Boston Corporation (California office) was still the lead bank and Dorsey & Whitney (Minneapolis) still the lead bond counsel.[63] A notable addition to the financial team was Evensen Dodge (Minneapolis) to serve as financial advisor to DNRC. DNRC had realized the deal was too complex to manage without expert advice from a consultant without a stake in the project. DNRC began discussions with its financial team prior to the Board's approval and was able to move immediately once it received the go-ahead. Deadlines imposed by FERC, and, more importantly, by the Tax Reform Act of 1986, required DNRC to move very quickly.[64]

DNRC had to issue two separate series of bonds, one taxable and one tax-exempt. This was done because project costs expected to be incurred after December 31, 1988, could not be financed with bonds exempt from federal taxes. Certain other project features (e.g., transmission lines) could not be financed with tax-exempt bonds at all. As had been intended since 1982, the bonds were revenue bonds, to be repaid by proceeds from the project itself, with the coal tax revenues to provide additional security. On November 5, 1987,[65] the Board of Examiners, on behalf of DNRC, issued and sold $22,200,000 of tax-exempt bonds.[66] At the same time, the Montana Board of Investments agreed to purchase up to $3,150,000 of taxable bonds[67] to complete the project.

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[63] Other parties included Jackson, Murdo, Grant & Larsen, P.C. (Helena), bond counsel; Shearson Lehman Brothers, Inc. (Seattle) and D.A. Davidson & Co. (Great Falls), managing underwriters; O'Melveny & Myers (Los Angeles) and Browning, Kaleczyc, Berry & Hoven (Helena), underwriters' counsel.

[64] Earlier concern with the 1984 tax reform bill on a similar point was eliminated when Senator Baucus, at DNRC's request, had Broadwater and the other dams grandfathered. This got them a more generous transition rule carrying through to January 1, 1986, instead of the end of 1984 as was the general transition rule. John Oitzinger, Oitzinger and Mullendore, to Rick Bondy, 6-25-84.

Since the Board of Investments is a state authority, it pays no taxes even on taxable bonds. DNRC agreed to an interest rate comparable to the Board's earnings on other investments with equivalent risk, in this case 10.5 percent. For its part, the Board agreed to accept private placement of the bonds. The issue was non-rated and subordinated in all respects with the lien on project revenues. The Board of Investments also agreed to purchase the taxable bonds only when and as requested. This arrangement was advantageous to DNRC, because it eliminated the need to reinvest bond proceeds, probably at a loss, until the funds were required. Further, DNRC saved the closing costs associated with public bond issues.

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[65] The bond closing had to be delayed slightly until the bids for the excavation and construction of the powerhouse were in, so DNRC would have a better idea how much money was required.

[66] State of Montana Coal Severance Tax Bonds Adjustable Convertible Extendable Securities, Department of Natural Resources and Conservation (Broadwater Power Project), 1987 Series A.

[67] State of Montana Coal Severance Tax Bonds, Department of Natural Resources and Conservation (Broadwater Power Project), 1987 Series B Taxable.

At the Board of Examiners meeting on March 30, 1989, $1,100,000 of taxable bonds was issued. Another sale, of $500,000, was made in May 1989. In January 1990, $3,800,000 of bonds was sold, bearing a rate of 9.5 percent. The proceeds of this sale were used to retire the 10.5 percent bonds sold in 1989 and to provide the final portion of project financing.

The bonds covered all capital costs, including a debt service fund required by the underwriters. It did not cover any of the money DNRC had spent planning the project. The total spent between 1978 and 1987 was $387,000.[68] In its final economic analysis in February 1987, DNRC had modeled establishing a cash flow reserve fund of $500,000 to cover the possibility of low water--and therefore insufficient income--during the early years. This was dropped from the bond issue at the insistence of the Director, who wanted to encourage the Broadwater project to come in on budget. Dropping the cash flow reserve fund also meant the bond issue could be smaller. Since the price MPC paid for the power rose over time, the possibility of income shortfalls would diminish and eventually disappear, if historical water flow patterns continued. In any event, the project still was backed by the coal tax revenues. These could be used as needed and repaid at a later date.

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[68] This total included the cost of the feasibility study, the FERC license, water right application, environmental studies and so forth. It also includes one-time costs, such as developing a leasing proposal, that would not be repeated for subsequent projects. Part of this cost was covered by federal grants and loans.

The bonds ultimately were secured by these coal tax revenues, though the expectation was that project revenues would prove adequate to retire the bonds. Specifically, the tax-exempt bonds were secured by a pledge of 50 percent of the revenues of the coal severance tax, project revenues from the sale of electricity, the amounts in the Debt Service Reserve Account, the amounts (if any) in the Replacement and Renewal Account, and proceeds of the 1987 bond sale. The taxable bonds were secured by the portion of coal severance taxes pledged on a parity lien basis to the outstanding coal severance tax bonds, and by a subordinated lien on the net revenues of the Broadwater Project.

The most innovative aspect of the Broadwater financing was the use of variable rate bonds. The interest rate on these bonds changes weekly. While they carry some additional risk, the history of these bonds is quite favorable. They consistently have been two to three percentage points below the current rate on new long-term fixed-rate bonds.[69] However, issuance costs are higher on variable-rate bonds. A letter of credit had to be obtained to make the variable yield bonds marketable. Most of the bidders were Japanese banks; the letter of credit was purchased from Sumitomo Bank. DNRC intends to convert the variable rate bonds to fixed rate bonds if interest rates drop sufficiently. The market floating rate for the first two years ranged between 4.6 and 7.9 percent when fixed rates were between 6.5 and 9.2 percent. The actual apparent rate paid by DNRC was higher because of extra costs associated with variable rate bonds; that cost averaged 6.3 percent during the first two years.[70]

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[69] The one exception is year-end fluctuations as funds are moved in and out of the variable-rate bonds for tax purposes.

Construction Contracts

Immediately following the Board's finding that DNRC should build the project, DNRC began the process of bidding contracts. At Tudor's recommendation, the project was separated into multiple contracts in hopes of meeting the December 31, 1988, deadline imposed by the 1986 Tax Reform Act. By issuing multiple contracts, construction could proceed on some portions of the project while design work was underway on other portions. Tudor Engineering was selected to design and oversee construction of the project. Tudor had done all the preliminary engineering and the Engineering Bureau was comfortable working with Tudor; in any event, DNRC had no time to bring a new engineering company up to speed on the project. Estimated engineering costs were $2,300,000.

The Broadwater Project was divided into six major contracts. These were (1) furnishing and installing the turbine, generator, electrical, and auxiliary equipment; (2) excavation and powerhouse construction; (3) furnishing electrical equipment and construction of a 100 kV substation; (4) transmission line construction; (5) furnishing inflatable rubber dams to replace existing flashboards on the spillway; and (6) modifying the spillway and piers, installing the rubber dams, and post-tensioning the dam (e.g., anchoring the dam to bedrock with steel cables or tendons).[71]

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[70] The estimated interest rates of 6.5 percent on the variable rate bonds and 11.5 percent on the taxable bonds as used by DNRC in its final in-house economic analysis compares favorably with the actual rates.

The contract for turbine/generator design and manufacture was awarded to Voith Hydro Inc. of York, Pennsylvania on September 22, 1987. Voith was the low bidder at $5,435,584. This was considerably more than the engineering estimate of $4,486,000, even though Voith's bid was almost $400,000 less than the next lowest.[72] From the start, design and construction proceeded rapidly. Installation of the turbine and generator into the powerhouse began on January 5, 1989. Substantial completion,[73] which required the project reliably produce power for a month, was in July 1989 (according to Voith and Tudor) or September 1989 (according to DNRC); this issue remained in dispute as of February 1990. The plant first produced commercial power on June 14, 1989. Almost all of Voith's work was completed later that fall.

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[71] The post-tensioning was done to meet new earthquake standards. It probably would have been necessary even if the hydroelectric project had not been built. The post-tensioning added about $560,000 to project costs.

[72] Since most turbine/generator sets sold in the U.S. are made by foreign or foreign-owned companies, DNRC staff speculated that exchange rates were heavily influencing the bids.

[73] "Substantial completion" means generally fit for the purpose for which it was built. "Final completion" means the owner has accepted the work as meeting specifications, and all contractual obligations have been discharged.

Sletten Construction Company of Great Falls was the low bidder for the excavation and powerhouse construction contract at $6,071,593, about $800,000 lower than the engineering estimate. Sletten began construction at the project site November 2, 1987. Sletten's work was substantially complete in May 1989, and complete in fall 1989, save for testing one item.

Lamb Engineering of Salt Lake City, Utah, was awarded the bid for the 100 kV substation at $881,337. Construction began on site in July 1988 and was substantially complete by December 31, 1988.

A low bid of $205,178 by Harp Line Constructors of Kalispell was accepted by DNRC for the transmission line contract. Work began in September 1988 and was substantially complete by December 31, 1988.

Originally the spillway was designed and bid to have steel radial gates installed in at least two spillway bays. The bids that came in March 1988 were higher than expected and more than the funds available; all bids were rejected. Larry Tegg, a DNRC engineer and inspector at the dam, suggested an alternative design to lower the cost of the spillway modifications. Based on his suggestion, DNRC decided to install inflatable rubber dams in the spillway bays. DNRC procured the rubber dams from Bridgestone Corporation, U.S.A. for $1,150,500 and accepted a proposal from Gracon Corporation of Loveland, Colorado to modify the spillway bays, post-tension the dam, and install the rubber dams for $1,717,000. This saved approximately $450,000 over the lowest radial gate bid. The rubber dams also provided better control of the reservoir level, reduced long-term operation and maintenance costs, and increased generating capability.

Numerous other smaller contracts were let to cover environmental mitigation, cultural resource surveys, acquisition of flood easements, development of recreational facilities, improvement of the access road and so forth. Approximately $928,000 was allocated for these contracts.

Construction Problems

The actual construction was beset by numerous delays and confusions. Many of these could be traced to the tight schedule and DNRC's lack of experience with projects of this magnitude. Final design for much of the project was completed after construction had begun. Tudor was sufficiently concerned about the schedule to request protection from the extra liability involved in a fast-track project.[74] DNRC threatened to terminate the project if Tudor could not offer a reasonable expectation of substantial completion by December 31, 1988.[75] Without that certification, DNRC could not issue tax-exempt bonds. Tudor balked right up to the time the bonds were to be issued. Having no other choice, DNRC specifically accepted the extra risks of running a fast-track project, including potentially higher costs or delayed construction. With that, Tudor made the guarantees DNRC needed to sell the bonds.

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[74] Tudor to Larry Fasbender, 8-26-87, 10-13-87, and 10-22-87.

[75] Larry Fasbender to John Williams, Tudor, 9-10-87.

This certification of the construction schedule was the first in a series of strained exchanges throughout the project that led at least some DNRC staff to raise questions about Tudor's ability and motivation. For instance, DNRC contracted with Tudor to provide an on-site Resident Engineer to manage and coordinate the contractors, and to inspect and ensure compliance with specifications. Tudor's first engineer quit late in 1988, after submitting his own independent bid on the spillway modifications. The next Resident Engineer left after two months for medical reasons unrelated to the project. The third Resident Engineer remained throughout most of the remaining construction, but continuity in project oversight was lost, diminishing DNRC's control of the project.

The powerhouse contractor, Sletten Construction, missed its schedule, which in turn delayed other contractors on site. The target operational date of the project slipped from March 15, 1989, to early May 1989 and then to mid-July. Sletten made claims against DNRC for additional payment virtually from the day work began on site. Numerous change orders that resulted from design work proceeding concurrently with construction increased DNRC's potential exposure to claims from it's contractors.[76]

Altogether, Sletten requested approximately $2.8 million in claims and change order compensation. DNRC maintained that it would pay any legitimate claims and for any contract changes required by itself or Tudor; DNRC figured these totalled to approximately $906,000. On March 17, 1989, DNRC reached settlement with Sletten on all claims at an adjusted contract price of $7,225,000, roughly $248,000 above the previously recognized contract adjustments. This settlement did not exceed the contingency funds DNRC allocated for the contract. In accepting the settlement, DNRC was mindful of advice from independent construction litigation specialists that DNRC could have significant liability due to the use of multiple prime contractors, the fast-track approach, and the poor project management provided by Tudor. Taking the claims to arbitration could have resulted in a greater expense than would settling.

Other contractors on the site were more cooperative; nonetheless, as is becoming common throughout the construction industry, they also made claims against DNRC. For example, Gracon, the spillway contractor filed approximately $300,000 in claims against DNRC, claiming Sletten did not provide timely access across the powerhouse (because it was not built) and

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[76] Sletten caused other problems for DNRC. For instance, in February 1988 Sletten caused water quality violations that led DNRC to voluntarily stop work until the contractor took mitigating measures.

Sletten's actions physically blocked approved access across the upstream cofferdam. Gracon eventually received $125,000 over the adjusted contract amount.

DNRC also made claims against its contractors. One example of these claims arose when DNRC found that the curb ring, a part of the turbine assembly that was embedded in concrete, had been misaligned. As a result, the parts that attached to the misaligned ring had to be sent back to Voith for machining to accommodate the misalignment. This had a direct cost of nearly $200,000 and an additional cost associated with the 38-day delay of approximately $228,000.[77] Tudor made a preliminary determination that Voith and Sletten shared responsibility for the misaligned curb ring. Settlement with Voith still was pending as of February 1990; Sletten previously had agreed to a general settlement, which included this particular problem.

Some delays caused change orders. For instance, Lamb Engineering, the substation contractor, and Harp, transmission line contractor, were delayed in making the final connections at the powerhouse because Sletten had not completed backfill of the powerhouse or poured footings for the transmission tower next to the transformer. This work was dropped from their contracts to avoid delay claims and was completed by other contractors through change orders.

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[77] Part of the delay was attributable to Voith's plant in York, Pennsylvania, being shut down between Christmas and New Year's.

In another example, Voith was supposed to test the turbine-generator unit to ensure that the equipment was performing according to specifications. This "index testing" would enable DNRC to correlate flow and electrical output on the basis of actual performance rather than on the theoretical performance curve derived from model tests. However, because of construction delays, Voith could not start testing until June 1989, after the river's flow had dropped below the maximum capacity of the turbine. Some testing was delayed until spring 1990.

In spite of all these delays and problems, the plant was completed and is producing. The formal dedication was September 11, 1989. Numerous bugs continue to plague the project but are slowly being resolved.

The final total cost for the project is not yet available. Some work continues, especially for environmental mitigation, and some claims still are being negotiated. No preliminary FERC budget category totals are available yet. The total expended or accrued to date is shown below. The table does not include anticipated claims settlements or most wages paid to DNRC personnel working on Broadwater. The debt service is net of interest on the bond sales proceeds, as of the end of January. Over $1.6 million remains from the bond proceeds as of January 31, 1990.

BROADWATER PROJECT COSTS (March 1990)

Engineering	$2,834,333
Land easements	76,521
Environmental mitigation	486,573
Civil works	9,686,958
Turbine/generator	5,548,921
Transmission lines/substation	1,249,894
Bond issuance costs	358,458
Debt service reserve	2,220,000
Debt service	1,304,791
Other	583,663
TOTAL	$24,350,112

Power Sales Contract

Power from Broadwater is being sold through a power sales contract that DNRC negotiated under the PSC 1986 order on avoided cost rates for QFs (Order No. 5091c, Docket No. 84.10.64). The negotiations leading to the contract were protracted because of DNRC's changing estimation of the economic merit of Broadwater, but were reasonably uncomplicated.

In July 1984, DNRC began negotiations on a power sales contract for Painted Rocks. By this time, DNRC was focusing only on marketing power to MPC, its rates being much more attractive than any the rural electric co-ops would offer. MPC provided a discussion draft to serve as the basis for negotiating a long-term power purchase agreement.[78] The negotiations turned to

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[78] Dorsey, Windhorst etc. (later Dorsey and Whitney) had developed a proposed power sales contract back in the fall of (continued...)

Broadwater by October 1984 while the RFP on that project still was out. DNRC's main concern was to begin serious negotiations before the PSC reduced the power purchase rates.[79] DNRC wanted a 35-year contract, with the option of deferring some considerations (e.g., determination of contractually defined generating capacity, and selection of full or partial levelization) until 1989. MPC accepted the 35-year term but not the deferred decisions. Though negotiating for its own interests, DNRC wanted a contract that could accommodate the on-going leasing process. DNRC wanted a clause that would allow DNRC to transfer the contract to the lessee. MPC opposed this because the security and insurance requirements for the lessee would be different than for the state.

By December 1984, DNRC and MPC were close to finalizing a contract. DNRC's retiring director, Leo Berry, leaned towards signing a contract, but opted to leave that decision to Larry Fasbender, the incoming director. Fasbender thought it would be inappropriate for DNRC, a public agency, to, in effect, be subsided by rate payers through the incorrectly high avoided cost rates. He declined to sign the contract, and DNRC lost its right to receive the higher QF rates of the old tariff. (See p.35.)

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[78] (...continued)
1980, which contained an avoided cost clause based on their interpretation of PURPA. Work on the contract was dropped after the 1981 lease legislation was passed.

[79] In 1984, a 35-year contract for Broadwater with MPC, using the fully-levelized rate, would have been worth 71 mills/kWh. Feasibility Update Report (8-84), Table III-4.

When the new and lower QF rates were published in the fall, DNRC put Broadwater and contract negotiations with MPC on hold.

Contract negotiations resumed in April 1987. In general, MPC's standard contract form for QFs was used. The most significant departure from the standard contract was the absence of security payments; MPC was willing to accept that the plant was backed by the State. Negotiation of the agreement was substantially completed by the end of June, and the contract was signed October 30, 1987. The contract was amended in March 1989 to extend it from 34 years to 35 years. Prior to requesting this amendment, DNRC had sought and received (January 1988) FERC's assent to extending the license from April 2024 to July 2024. This made DNRC eligible for MPC's 35-year rate, the rate on which DNRC had based its economic analyses.

Broadwater came in under MPC's LTQF-86 tariff, Supplement No. 1. DNRC chose nominally levelized capacity payments and escalating energy payments. The capacity payment is $15.11 per kilowatt in winter and $8.34 per kilowatt per month in the summer. The energy payment is revised each year according to a fixed escalation rate.

DNRC's contract gives it up to a year to determine what monthly contract capacities it would offer. The delay in Voith's testing until spring 1990 hampered DNRC in making these determinations. Tudor had conservatively estimated that monthly capacities should vary between 1.4 MW in August and 9.1 MW in

November.[80] Once the contract capacities are fixed, DNRC will be penalized if it falls 30 percent below those capacities. It will have to refund payments made for firm capacity that was found to be non-firm, plus a 10 percent interest charge.[81] For shortfalls of less than 30 percent below contract capacity, MPC can drop the contract capacity to the lowest monthly capacity DNRC actually produces.

Until DNRC settles on the monthly generating capacities for which it is prepared to guarantee delivery, the average price per kWh of the contract cannot be calculated. For planning purposes, DNRC estimated the first year value to be 37.4 mills/kWh.

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[80] Tudor calculated the contract capacities by dividing by 0.7 the historical lowest maximum average daily capacity values for each month based on recorded water flows. The intent was to arrive at a contract capacity that could not cause MPC ever to impose a penalty. Capacities calculated for the winter period were: December, 8.1 MW; January, 6.9 MW; February, 7.4 MW; March, 8.4 MW; and April, 8.4 MW. Summer period capacities were: May, 7.3 MW; June, 7.1 MW; July, 3.3 MW; August, 1.4 MW; September, 3.4 MW; October, 8.3 MW; and November, 9.1 MW. Hugh Brown, Tudor Engineering, to Norm Barnard, 5-21-87.

[81] MPC reasoned that the interest rate charged should reflect that ultimately it was the rate payers who financed the payments for the non-firm capacity. "Ten percent was chosen as a representative return that a rate payer might reasonably expect to receive on an alternative investment." Ted Williams, MPC, to Sarah Bond, DNRC, 8-7-87.

Interconnection

In 1985, DNRC started looking seriously at the problem of connecting Broadwater with the power grid. In its license application to FERC three years earlier, DNRC assumed that the connection would be a 100 kV line running about one mile south to an MPC line near Lombard, on the east side of the river. Brief discussions with MPC in 1983 added the possibility of connecting to the Trident-to-East Helena 100 kV line, which ran west of the river, but no interconnection studies were done. DNRC renewed discussions in 1985, inspired by the FERC license requirement to submit a transmission line design plan by April 23, 1985. (This deadline later was postponed three months until July at DNRC's request.) DNRC had obtained tentative agreement earlier that year from MPC to allow connection to its lines.

The transmission design report included four options. Of those, Tudor recommended a line about three miles long that would follow the existing Broadwater canal and access road to connect with MPC's Trident-to-East Helena 100 kV line (see Map, p. v). The choice was based on minimizing the construction cost and the environmental impacts associated with river crossings and agricultural land. Under this option, DNRC was to construct a 100/4.16 kV substation at the dam, using a 10 MVA transformer and a 4.16 kV breaker. The Broadwater line would use three 100 kV breakers to tap MPC's line.

Discussion on the final design of the interconnection to MPC's system began in May 1987, shortly before the Board gave final approval for Broadwater. The major issues MPC identified were possible changes in relay equipment at both the East Helena and Trident Substations as a result of bisecting that line, and the need to telemeter certain project operating parameters from Broadwater switchyard to MPC's System Operation Control Center (SOCC) at Butte. MPC in subsequent meetings also alluded to rerouting its existing line slightly to accommodate the substation; DNRC only belatedly realized that this would cost the Department an additional $37,000.

MPC's concern about possible relaying changes eventually proved to be founded. MPC had decided that a new relay panel at Trident and a 100 kV transformer would be necessary. Tudor originally felt that the problems introduced by breaking the 57-mile line segment between East Helena and Trident into a 45-mile East Helena to Broadwater and a 12-mile Broadwater to Trident segment would not require additional protective relay requirements. In May 1988, MPC, as requested by DNRC, produced a detailed explanation of the relay requirements. DNRC reluctantly agreed to the $98,000 expense to install equipment required by MPC.

The substation and the line were completed and ready for testing by the end of 1988. The final arrangement was that DNRC would own the substation and MPC would operate it at the state's expense. A leased phone line, permitting both voice and data communications, connected DNRC's powerhouse with MPC's SOCC. A Sangamo Quantum Meter was installed for billing purposes at the connection between the Broadwater line and MPC's line.

Water Rights

On December 30, 1977, DNRC filed for the right to appropriate water for hydroelectric generation at Broadwater and the other two projects. Little happened on those applications until after the preliminary Broadwater project permit was granted by FERC. DNRC did not even go to the Board for authority to obtain a water use permit for Broadwater until two months after receiving the preliminary FERC permit.

In conjunction with its work on the application for a FERC license, DNRC started on a Preliminary Environmental Review (PER) on the granting of water rights for the Broadwater Project. The PER described environmental impacts as minimal. One of the more troublesome issues was water availability. DNRC, in the spring of 1981, conducted a study of water availability in the Missouri basin above Broadwater. The study found that, most of the time, upstream water development would be limited by the Bureau of Reclamation's water rights for its turbines and irrigation projects at Canyon Ferry Dam, and not DNRC's prospective rights at Broadwater. However, the study also turned up the Bureau's claim that it had rights for 200,000 acre-feet upstream, a claim later raised to 300,000 acre-feet. DNRC eventually concluded that the legal questions raised by the Bureau's claims were not easily resolved, and that an EIS would resolve no more than would a PER. All that taken into account, DNRC finally decided (6-4-82) that a PER would be sufficient.

While the PER was being prepared, the local water rights field office notified the Engineering Bureau of the Water Resources Division (1-14-81) that its application was deficient. It lacked definitive information on the amount of water requested and payment of a filing fee. The Engineering Bureau settled on 7,200 cfs as its claim, and went to the Board to seek exemption from the filing fee. This was not granted and eventually the Engineering Bureau paid a $26,385 application fee to the Water Rights Bureau. At the time DNRC still expected these costs to be repaid by whoever eventually developed Broadwater.

DNRC's water rights application was publicized in the newspapers in May, 1981. Objections were received from three parties. Byron Johnson, Toston, was worried about the effect on his placer mining at Devil's Bottom, slightly upstream from the dam. The Bureau of Reclamation objected because the project would raise the pool elevation and threaten to flood the Crow Creek Pumping Station. Later that year, Maurice and Lucia Ferrat, who leased the placer mine to Johnson, objected to protect their property rights and their 1875 water right.

The Bureau's objection was dismissed because it did not fall within the Department's jurisdiction under water law. The Ferrat's objection was rejected as untimely. Only Johnson's objection was accepted. The Ferrats later were given standing based on Johnson's objection because they actually held the water rights on which it was based.

Receipt of a valid objection made a hearing necessary. This hearing initially was not scheduled to occur until June 23, 1982. Because of DNRC's involvement in the case, no DNRC employee could serve as the hearing officer; therefore, a lawyer from the Justice Department was appointed. The hearing itself was put off continually as DNRC and the Ferrats engaged in desultory negotiations aimed at compensating the Ferrats sufficiently for them to drop their objection. Neither side was in a hurry. The Ferrats were using the water rights issue to guarantee they got a fair price for their property rights, which DNRC did not want to buy until it actually was ready to start on Broadwater.

By April 1985, the Water Rights Bureau was sufficiently worried about the slow pace of the Broadwater filing to voice its concern to the division administrator.[82] Evidently, the Broadwater project team had hoped to negotiate a settlement rather than force the issue, since any such settlement would cost less than the legal costs of condemning the land. Hearing dates were set once again, and DNRC and the Ferrats negotiated a little more seriously. Several postponements later, in September 1986, DNRC and the Ferrats signed an agreement to negotiate a settlement and the Ferrats withdrew their objection. DNRC's application was returned by the hearing officer to the Water Rights field office. A provisional water use permit was issued in December 1986, good until April 1991; the 1991 deadline was set at the request of the Engineering Bureau.

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[82] "(I think this) is a case where the Department may be criticized for sitting on a priority date and not pursuing the settlement diligently." Larry Holman, Chief, Water Rights Bureau to Gary Fritz, Administrator, Water Resources Division, 4-18-85.

Negotiations with the Ferrats dragged on until September 1988. The Ferrats were determined to get value for their placer mine, even though independent appraisers had determined that it was close to worthless. Many compromise offers later, DNRC purchased an easement for the reservoir, a flood easement, and a right-of-way for the transmission line for $36,000.

Impacts - Fisheries

DNRC believed that Broadwater would have only minor environmental impacts; however, others disagreed from the start. Government agencies raised concerns on fisheries, wildlife, recreation, and archaeological/historical resources. Burlington Northern Railroad was concerned about the possible impact on its tracks from raising the pool elevation. The Bureau of Reclamation was similarly worried about impacts on its Crow Creek Pumping Station, which supplies irrigators upstream from Broadwater Dam. The fisheries issue caused the longest-running problems for DNRC; the uncertain but potentially high costs of mitigating the fisheries impacts could have seriously affected the economic feasibility of Broadwater.

The Montana Department of Fish and Game (after 1980, Department of Fish Wildlife and Parks--DFWP) was the lead advocate for the fisheries. When first asked in 1980, the Department said, "the key to protecting and enhancing (the fish and wildlife) resource will be the amount and pattern of instream flows."[83] Fish and Game recommended a study of instream flows. When it learned later that year that Broadwater would be a run-of-river dam, Fish and Game reevaluated its original impression of possible impacts and submitted a proposal for a $51,000 study to determine if a fishway and associated turbine bypass system (i.e., fish ladder) would be necessary. The study also proposed to look at wildlife impacts of raising the pool elevation. Neither DNRC nor Tudor felt the study would find impacts of any consequence, but decided that offering to do the study as a condition of the license was the only way to obtain the license in a timely manner; objections raised by any agency would have slowed the licensing process. It was a minimal cost to gain some certainty in planning the project.

After the FERC license was issued, DNRC had two years to complete the study. A contract for the entire study was signed in April 1985. The study plan was a revision of the 1980 proposal, with a budget reduced to $35,000; the cost dropped in part because the study fit in with other work DFWP was doing. The fisheries portion of the study was prepared by CH2M Hill.

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[83] Keith Colbo, Director, Department of Fish and Game to Ted Doney, 8-7-80.

The study concluded that a fish ladder would not be a good idea. CH2M Hill based its conclusion on a number of reasons; the most significant concern was that unwanted fish (e.g., fish eaters such as northern pike and walleye) would get into the trout streams of the upper Missouri basin. Though more broadly based, it was a conclusion similar to that previously reached by DNRC in its license application to FERC. In the revised "Report on Fish, Wildlife, and Botanical Resources" submitted to FERC in April 1986, DFWP specifically recommended against a fish ladder.

FERC staff deemed the revised report insufficient. For fisheries, they demanded more information on downstream movements of fish, on possible impacts on fish going through the turbines, and on fish screens that could be used at Broadwater. Neither DNRC nor DFWP understood why FERC requested such a massive amount of supplementary information. They doubted that the likely impacts would warrant the effort FERC was requesting. DFWP staff suggested spending money for actual mitigation instead of for the time-consuming and expensive study FERC requested. The U.S. Fish and Wildlife Service (USFWS) preferred running extensive studies to ensure the level of mitigation matched the level of impacts; nonetheless, it grudgingly supported mitigation without study. USFWS and DFWP both expressed concerns that the revised design of the dam suggested by Tudor Engineering could increase the environmental impacts of the project.[84]

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[84] The original apron mount design of the turbines would have entailed water coming over the top of the dam down to the (continued...)

DNRC, needing a fixed project cost estimate to take to its bankers, and assurances that a two or three year study would not be necessary, was in no position to bargain with the fisheries agencies. DNRC was about to request permission from FERC to change Broadwater's design from four apron-mounted turbine-generator units to a conventional configuration with a single turbine. Negative comments by the fisheries agencies could have led FERC to require DNRC submit a license amendment, with all its attendant paperwork.[85] DNRC agreed to spend $394,000 to increase the number of trout below Broadwater via improving spawning habitat. The option preferred by DNRC and DFWP was a channel to connect Big Spring Ditch (a spring-fed irrigation canal downstream from the dam) and the Missouri River; however, the departments promised FERC they would study a range of

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[84] (...continued) turbines. The switch to a conventional power project arrangement, located to the side of the dam, meant water would come through a canal at the side of the pool. The fisheries agencies expressed concern about increased mortality, releases of sediment from the pool behind the dam, and movement of undesirable fish upstream through the power house (e.g., see John Ward, Field Supervisor, Ecological Services, USFWS, to Norm Barnard, 5-5-87). DNRC didn't think that the impacts would be significant, a conclusion confirmed by further studies. DNRC did agree to a comprehensive monitoring program to keep track of the build up and distribution of sediment in back of the dam, with controlled flushes during high water as necessary.

[85] In addition to being vulnerable to the fish agencies withholding their assent and thus putting DNRC's license at risk, DNRC faced challenges from public interest groups. Trout Unlimited actually threatened DNRC with litigation if DNRC did not build a spawning channel and work with DFWP (Tim Meloy to Larry Fasbender, 7-8-87). Gallatin Wildlife Association and a senior local legislator also offered their opinions that a fish ladder was necessary.

possibilities. This improvement in the downstream fishery was intended to mitigate any losses caused by the hydroelectric project.

On July 6, 1987, DNRC sent FERC its proposed turbine design changes, along with letters from the various reviewing agencies, which did not object to the proposed changes. FERC ruled August 18 that the changes did not require an amendment to the license, with all the delay that would have brought.

On August 14, DNRC submitted a revised "Fish, Wildlife, and Botanical Resource Report," which contained the plans that had forestalled fishery agency objections. FERC again rejected the fisheries portion of the report. DNRC requested several extensions as it and DFWP tried to develop a reasonable solution. Further study by DNRC and DFWP indicated that the Big Spring plan was both high cost and high risk. By the summer of 1989, the departments were considering some combination of constructing a smaller spawning/rearing channel, possibly in the Canyon Ferry Wildlife Management Area,[86] and restoring habitat on some tributaries between Canyon Ferry Dam and Broadwater Dam. Their strategy was to diversify the mitigation to lower the risk of failure. In a progress report to the Board of Natural Resources and Conservation, DNRC observed that it was "relying heavily on DFWP not only to assess those aspects of biological feasibility and risk for mitigation alternatives, but also to help implement the measures. Since DFWP has such a major role in carrying out the mitigation package, the sort of (reviewing agency) dissatisfaction that typically results in fines levied by FERC is highly unlikely."[87] DNRC hoped to avoid damage both to the environment and to the economics of Broadwater.

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[86] Managed by the Bureau of Reclamation.

Impacts - Wildlife and Botanical

The potential impacts to wildlife and vegetation resulted primarily from DNRC's proposed change in operating the pool behind the dam. In the past, the pool was lowered each winter by about 9 feet, and brought up again during the irrigation season. DNRC proposed to raise the level by 1.6 feet above the maximum summer level and to maintain a stable pool elevation year-round. This meant that about 10 acres of willows and emergent plants (e.g., cattails) along the shores and on some small islands would be destroyed. This destruction would decrease cover and food for waterfowl and some mammals. In particular, inundation of the islands would eliminate some nesting habitat used by Canada geese and other wildfowl.

As it had done with fisheries, FERC in its September 10, 1986, letter asked for a significant amount of supplemental information about impacts to vegetation. The following May, DFWP, as it had done for fisheries, proposed skipping the requested studies and going directly to mitigation, based on information previously collected by DFWP on the Canyon Ferry Wildlife Management area. The mitigation eventually agreed upon included construction of a 10-acre emergent vegetation pond and three acres of waterfowl nesting islands at Canyon Ferry. DNRC and DFWP agreed on a maximum allowable expenditure of $52,510 for these features.[88] Agreement later was reached with the Bureau of Reclamation, which had not been in on the negotiations in the beginning. The emergent pond was completed in the summer of 1988. The nesting islands were built during the winter of 1989-1990.

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[87] "Progress Report on Wildlife and Fisheries Mitigation for Broadwater Power Project - Summary" (July, 1989).

Impacts - Recreation

Recreational development at Broadwater was minimal prior to construction of the hydroelectric project. There were two pit toilets, one trash can, and one picnic table, all poorly maintained. A sloping unsurfaced area just upstream from the dam served as a boat access, and open space downstream was used for parking.

The development of the recreational plan got tangled up in DNRC's negotiations with BLM to obtain rights to flood BLM land in the project's backwater. BLM added a stipulation to DNRC's existing right-of-way agreement that forced DNRC to include those recreation facilities it previously had discussed with BLM and DFWP. DNRC did try to gain something from the recreation development by asking BLM to take that development as compensation for the BLM land and right-of-ways that DNRC acquired. The local BLM office was willing to consider the issue; however, FERC staff announced that they probably would veto it, since the recreation improvements already were required by the license.[89]

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[88] U.S. Fish and Wildlife Service was unhappy with the state setting a maximum amount to be spent on mitigation, both for fisheries and wildlife, and then working back to specific mitigating measures (e.g. see John G. Wood, Acting Field Supervisor, Fish and Wildlife Enhancement, USFWS, to Norm Barnard, DNRC, 7-30-87). DNRC's and DFWP's rationale was that the agreed upon amount probably would provide for more mitigation than the proposed studies would show was required.

DNRC filed a recreational resources report on April 23, 1986, revising the recreation section of its license application. The revised report called for maintaining a walkway across the dam to the east bank, razing the existing boat ramp and adjacent waste dump, and constructing a new concrete boat ramp, a restroom, a graveled entry road and parking area with BLM-designed traffic barriers, a bulletin board, and an interpretive sign. DNRC would have preferred less extensive and expensive recreational improvements. However, since DNRC was purchasing land and flood rights from BLM, its freedom to negotiate was limited.

A related improvement, a boat restraining barrier, was required as a safety item. This was one of the items DNRC had stalled on, back in 1985 through early 1987, as it reassessed its commitment to the project. When DNRC finally did propose a design in the spring of 1987, FERC was not satisfied. FERC first suggested a cable and float design. DNRC accepted. Then FERC required an "on-the-water" design. DNRC responded by proposing a log boom, but identified problems with it. So FERC suggested DNRC consider a cable and float design. FERC wanted it installed in 1987, before construction began. DNRC pointed out that doing so would be expensive and probably ineffectual, given the other construction plans. A cable and float barrier was installed during the summer of 1988.

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[89] Greg Wermers, DNRC Assistant Hydropower Engineer, "Daily Notes on Broadwater," 1-14-86.

Impacts - Cultural Resources

DNRC, as part of its license application to FERC, was obliged to identify any cultural resource sites that might be affected by the project. DNRC documented four sites in its application. Two of these appeared to meet the criteria for inclusion in the National Register of Historic Places. The first site was a post-1900 coke oven structure with an associated coal mine, slag piles, and other facilities (site # 24BW180). It was located about a mile downstream from Lombard, or about 3.5 miles above the dam. The second site (site # 24BW182) was a partially buried prehistoric campsite about 2.5 miles upstream from the dam. Part of the campsite was exposed in a river bank that was collapsing into the existing reservoir.

The license required further study of these sites and development of mitigation plans. DNRC had to work with the State Historic Preservation Office (SHPO). The studies were carried out during 1985. Two other sites were added to the list, but only the two sites previously identified as significant were found to warrant mitigation plans. The coke oven site was not directly affected by the higher reservoir levels; however, SHPO feared that possible increases in recreational use of the reservoir, caused by improvements mandated in DNRC's license, could lead to increased vandalism. SHPO wanted DNRC to take responsibility or liability for the site in the event of vandalism; DNRC agreed to monitor the site for five years and to take action if any increases in vandalism were noted. The campsite, because it already was collapsing, was to be excavated and mapped by a team of archaeologists. This was carried out in 1988. As a requirement of the license, DNRC also pledged to monitor the other minor sites twice a year.

The study of the cultural resources and the development of mitigation plans went relatively smoothly. It was cheap enough to be continued even in 1985 and 1986 when the future of the project looked uncertain.

Impacts - Railroad Tracks

Montana Rail Link owns the rail line that runs along the east shore of the reservoir. It purchased the line from

Burlington Northern (BN) in 1987. DNRC started planning Broadwater when BN still owned the track. BN was particularly worried that the higher winter pool elevations caused by the hydroelectric project would undermine the roadbed or make it vulnerable to ice damage. The section of track through the canyon above Broadwater was some of the worst on the system, with accidents a regular occurrence, and BN did not want any more problems. DNRC was concerned because mitigating the impacts on the railroad could be expensive; at one point, DNRC estimated the cost of that mitigation in the worst case could be $5 million.[90]

DNRC and BN started talking about impacts of the project on the railroad track in the fall of 1984, after FERC issued a license to DNRC. Possible solutions to potential problems ranged from more riprap, through raising the elevation of the entire length of track along the reservoir, to building a tunnel to avoid the reservoir.

With such expensive solutions being suggested, DNRC wanted to determine exactly what effects icing conditions caused by the project would have on the railroad. During the winter of 1985-1986, DNRC personnel, in cooperation with BN, conducted a survey of existing icing conditions.[91] The following summer, DNRC contacted the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CREEL), Hanover, New Hampshire, about conducting a study of icing and the Broadwater project. DNRC authorized CREEL to begin the study in the fall of 1986, concurrent with the reappraisal of the economics of Broadwater.

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[90] Norm Barnard and Glen McDonald to Rick Bondy, 11-15-85.

[91] DNRC previously had intended to hire a private contractor to do the study, but the suspension of the project forced a budget cutback.

The study found that the ice conditions, and their impacts on the railroad, would not be aggravated by DNRC's proposed project. BN agreed with these conclusions, and proposed that DNRC protect the tracks by building a new culvert, installing a 200-foot earthen dike, and agreeing to maintain riprap along the reservoir below the track. Negotiations continued into 1988, with the major change being the elimination of the riprap provision. The agreement was dated February 24, 1988; Montana Rail Link, which had purchased the track from BN the previous fall, also was a signatory to the agreement. The total estimated cost of mitigation was $34,216, using the railroad's design and labor.

Impacts - Crow Creek Pumping Station

The Bureau of Reclamation built and operates the Crow Creek Pumping Station to irrigate land drawing water from above the Broadwater Dam. The pumping station is located about one mile upstream from the dam. Raising the pool elevation for the hydroelectric project threatened to flood the pumping station. From the very start, the Bureau's goal was to protect the station, or at least get someone else to pay for flood proofing.

The Bureau was on the case even before DNRC formally took up the Broadwater Project. In May, 1978, after Vigilante had filed its preliminary permit, the Bureau wrote to DNRC asking it not to grant any permits if Vigilante's development would submerge its pumps.[92] After DNRC got its preliminary permit, the Bureau tried to block the project by objecting to DNRC's water rights application; the objection was denied.

The Bureau's next move was to get DNRC to pay to mitigate possible effects of submerging the pumps. The Bureau maintained that the Broadwater project would worsen the existing intermittent flooding of the pumping station. In a November 16, 1982 meeting among DNRC, the Bureau, and the Broadwater Irrigation District, the Bureau suggested that raising the floor of the pumphouse (estimated cost: $100,000) was the most probable solution. DNRC countered by sending the Bureau a copy of its 1941 agreement with the Bureau that gave DNRC the prior right to flood the land upon which the Crow Creek Pumping Station was located. Negotiations continued over the next two years. The major concerns were ice damage and flooding caused by the higher reservoir levels during the winter. The Bureau agreed to study the problem.

As a fall-back position, the Department of the Interior, on behalf of the Bureau, petitioned FERC to amend the license to provide specific protection for the pumping station. DNRC first learned of this in a letter from FERC dated February 13, 1985.

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[92] E.R. Wilde, Regional Director, Bureau of Reclamation, Billings to Ted Doney, 5-24-78.

FERC treated Interior's proposal as a complaint, the resolution of which might have required a full-blown hearing before FERC with DNRC as the defendant. The parties involved eventually agreed to negotiate a good faith cost-sharing arrangement among DNRC, the Bureau, and the Irrigation District.

The Bureau's Billings office continued to insist that an ice jam during spring thaw could result in serious flooding of the pumping station.[93] DNRC offered to address the effects of ice on the Crow Creek Pumping Station in its ice study (see p.81). That study concluded that serious ice damage was unlikely. Even so, the study done by CREEL for DNRC did recommend raising the pump units and surrounding service yard to provide some freeboard and prevent nuisance ice from affecting the pumphouse.

The negotiations proceeded slowly while the project was on hold. When they started up again in 1988, the Bureau still was asking DNRC to pick up two-thirds of the costs. DNRC still thought the Bureau's argument had little merit. However, the Bureau was in a position to deny or attempt to deny DNRC's request to mitigate the impacts of Broadwater by placing nesting islands and an emergent vegetation pond at Canyon Ferry. The Bureau also, if it wished, could charge operation and maintenance costs caused by conditions at the reservoir over which DNRC had no control, and thereby add additional uncertainty to DNRC's total costs. Notwithstanding the flood easement DNRC already held, DNRC's project manager recommended trying to settle a 50-50 cost share arrangement with the Bureau, but to settle in any event.[94] The Bureau's final objection was that it had neither legal authority nor money to spend on raising the pumping station out of danger of flooding. Whether that was true or not, DNRC needed the Bureau to provide some matching funds. DNRC went to Montana's Congressional delegation, and $150,000 was added to the Bureau's budget for the pumping station, with the understanding that DNRC would match up to that amount as necessary. The pumping station was raised in the fall of 1988.

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[93] B.E. Martin, Regional Director, Bureau of Reclamation, Billings Office to Larry Fasbender, 12-22-86. The Billings office disagreed with a brief analysis done by the Bureau's Denver office, which predicted some, but not serious, flooding (Memo from Acting Assistant Commissioner - Engineering and Research to Regional Director, Billings, 1-24-85). The Bureau did not supply DNRC with a copy of that report until almost two years after it had been completed.

Conclusions

This paper does not completely document the Broadwater Project. The participants suffered through many more events than one needs to know for energy planning purposes. Managing the construction itself was messy and complicated, like any other fast-track project, even if the amount of litigation spawned to date is less than typical. Monthly reports to FERC and regular inspections at each stage of construction were unavoidable facts of life for the project team. Obtaining easements--dealing with current owners, surveyors, appraisers, and county courthouses--was time consuming, but not unique to Broadwater. Pending is the decision on contracting out project O&M; DNRC personnel will handle the O&M at least through the end of 1991. These issues and more took up the time of those working on Broadwater.

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[94] Wayne Wetzel to Larry Fasbender and the Broadwater team, 6-23-88.

Several lessons can be drawn from the long history of Broadwater. First, avoid fast-track projects, multiple prime contractors, and inexperienced project management. Second, public agencies will respond to their constituencies and to public oversight, even when it is not in the best interest of the project. Third, outside parties will use government regulations, both environmental and financial, to extract concessions from the developer. Finally, cost and schedule estimates are just that; any convergence with later facts is in part fortuitous. (See Appendix for a summary of the evolution of Broadwater's design and budget estimate.)

These lessons are nothing new. And that may be the most important lesson to draw from Broadwater. Things happen. Circumstances and events are unpredictable. They surprise even people who know they will be unpredictable. The uncertainty only recently incorporated into utility planning models does have a real world correlate. The Broadwater Project is ample proof of that.

APPENDIX: Evolution of Design and Budget

Both the proposed design and the estimated budget for Broadwater went through a number of changes. The following list is drawn from a variety of reports, letters, and memos prepared on the project; the dates are the first time the design or budget appeared in documents now on file with DNRC. The estimated budgets have not been adjusted for inflation; where available, the year's dollars of the budget estimate is reported.

4-77 Two 5.5 MW turbines might be feasible. (BPA to Vigilante Electric Cooperative, 4-12-77)

5-77 Six tube-type hydraulic turbines and generators of 2,400 kW capacity each, for a total of 14.4 MW, are suggested. These would be installed on the left abutment (looking downstream) of the dam with a separate canal with a capacity of 7,000 cfs. A 31 foot head is assumed. Average production is estimated at 88 million kWh. Installed cost is estimated at $8 million, plus transmission costs. (Tudor to DNRC, 5-5-77)

7-77 An innovative design involving mounting the six turbines on the downstream apron below the spillway is proposed. (Tudor to DOE, 7-11-77)

12-77 The innovative design could save 20 percent of the total capital cost compared to a more conventional design. (Tudor to DNRC, 12-6-77)

1-78 Head now assumed to be 28 feet, using the innovative design with 14.4 MW capacity. Annual output estimated at 78 million kWh. Estimated cost is $14,963,000 (Fall 1977 $). (Report on Potential Hydroelectric Power For State Owned Dams, by Tudor for DNRC, 1-78)

6-78 DNRC's preliminary permit application to FERC uses the same design and costs as in the 1-78 report, but average annual output is estimated at 90 million kWh.

4-79 Design now is four 2.44 MW turbines on spillway face and apron. Head is assumed to be 22 feet. Average production estimated at 56.44 million kWh. Construction cost is $11,847,000 (March 1979 $). (Vertical Turbine-Spillway Combine, Broadwater Dam, prepared by Tudor for DNRC to submit to U.S. Department of Energy)

5-82 DNRC's application for a FERC license is based on the 4-79 report. Construction cost, with contingencies, is estimated at $14 million (February 1982 $); total capital cost (i.e., all construction and preparation costs plus interest during construction) is estimated at

$22,900,000 (February 1984 $), assuming 12 percent interest costs.

8-84 Design is same as in FERC license. Construction cost plus contingencies estimated at $14,953,000 (January 1984 $). Total capital cost ranges between $21,577,000 (6 percent interest) to $23,044,000 (12 percent interest) in February 1986 $. (*Feasibility Update Report on Hydroelectric Projects*, prepared by Tudor for DNRC)

9-85 Tudor recommends switching to a conventional turbine design, mounted to the side of the dam. (Meeting with DNRC staff on 9-3-85)

10-85 Previously excluded mitigation costs could add $2,690,000 to the 1984 estimates in the most probable case; the range of those costs was $1,005,000 to $7,150,000. (Norm Barnard and Glen McDonald to Rick Bondy, 11-15-85)

3-86 Total capital costs estimated at $28,358,000 (February 1987 $). (Rick Bondy to Don Porter, First Boston, 3-26-86)

5-87 Project would be a single 10 MW conventional design. Average annual production estimated at 62.02 million kWh. Total construction cost is $20,665,000 (December 1987 $). Total capital costs estimated at $26,000,000. Unlike previous estimates of capital cost, this estimate includes financing costs on the bond sales, reserve funds, and interest earnings on the bond proceeds. (Definitive Project Report: Broadwater Power Project, prepared by Tudor for DNRC).

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